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Report

of

Rochester Milk Survey

by the

Committee on Public Safety

of the

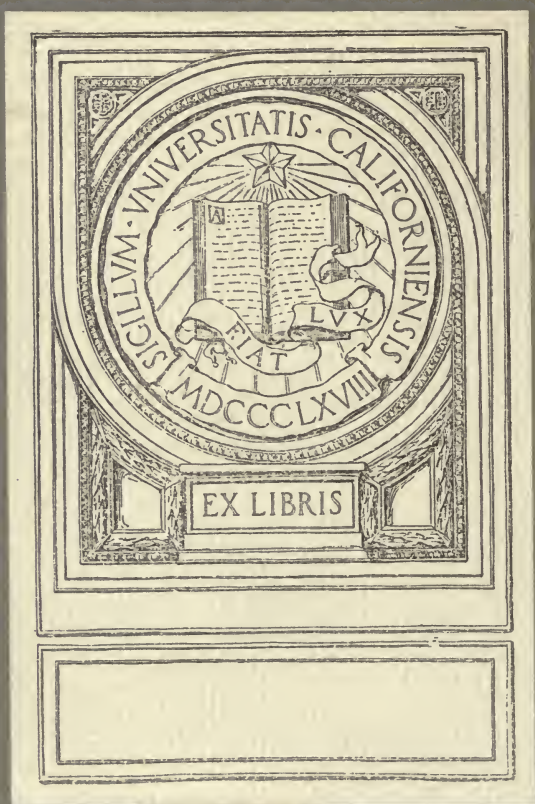
Common Council



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Report of Rochester Milk Survey

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Committee on Public Safety
of the

Rochester. Common Council ~



Apr 20-1988

Charles E. North, M.D., *Director*

December, 1919

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I

GENERAL INTRODUCTION

In response to a widespread demand on the part of many of the citizens of Rochester for an official investigation of the high cost of milk, and the recognition by the city officials that the cost of milk had greatly increased in recent months, the Common Council of the City of Rochester planned to conduct a milk survey in accordance with the following resolution:

City Clerk's Office,
City Hall,
Rochester, N. Y., July 10, 1919.

To Whom It May Concern:

I Hereby Certify, That at a session of the Common Council of the City of Rochester, held in the City Hall on Tuesday, April 22, 1919, an ordinance was adopted, of which the following is a true copy; and that at the time said ordinance was adopted the Common Council of said City consisted of twenty-four members.

By ALD. HART—

Be it ordained by the Common Council of the City of Rochester as follows:

Section 1. The Committee on Public Safety of the Common Council is hereby authorized and directed to investigate and inquire into the distribution of milk used in the City of Rochester and the sanitary conditions surrounding the same and the cost thereof; and as to the expediency of the purchase and distribution by the city of all milk used in the city; and as to the expediency and expense of any other method designed to secure the control by the city of the distribution of milk; and into the production of milk used in the City of Rochester and the sanitary conditions surrounding the same and the cost thereof; and as to the expediency and expense of the production by the city on municipally owned farms of all milk used in the city; and to report to the Common Council the result of its investigation with such recommendations concerning the same as it deems proper.

Sec. 2. The employment of one or more experts to assist said Committee in its investigation is hereby authorized, such employment to be without competition, at a compensation to be fixed by the Board of Estimate and Apportionment, and it is hereby declared to be impracticable to procure the services of such experts by competitive contract.

Sec. 3. This ordinance shall take effect immediately.

Adopted by the following vote:

Ayes—Aldermen Cauley, Ward, Hart, Somers, Friedler, Rosenberg, Messinger, Kane, Steelsmith, Carroll, Chilson, Cook, Russell, O'Neil, Bareham, Stahley, Rappeye, Morgan, Hoffman, DePotter, Dentinger, Hannahs, Ruppel.—23.

Nays—None.

And I further certify that said ordinance was submitted to His Honor, the Mayor of said City of Rochester, by whom the same was approved.

Attest:

JOSEPH A. CRANE,
City Clerk.

The present director of this survey was employed by the City of Rochester to organize and conduct a milk survey, beginning on July 8th, 1919.

A SURVEY OF MILK SURVEYS

In order that the proposed survey might be planned in a manner that would insure results of the most practical value to the city, consideration was first given to the work performed in previous milk surveys. All of these include plans of organization, subjects of study, and recommendations which are contributions to the plans for the Rochester Survey and a brief consideration of them will form the best possible introduction to the present Rochester Survey.

The list of these surveys is as follows:

<i>Date</i>	<i>Place</i>	<i>Auspices</i>	<i>Directed by</i>
1911-12	Rochester, N. Y.	Private	Dr. John R. Williams
1915	Detroit, Mich.	U. S. Dept. of Agriculture	C. E. Clement and G. P. Warber
1916-17	New York State	New York State Senate and Assembly	Senator Wicks
1917	Berkeley, Cal.	University of California	Elwood Mead
1917	New York City	Mayor's Committee on Milk	Dr. Charles E. North, Chairman
1917	New England	Boston Chamber of Commerce	R. W. Bird, Chairman
1917	Pennsylvania, Maryland, Delaware	Governors' Tri-State Commission	Dr. A. G. Gilbert, Secretary Dr. Clyde L. King, Chairman
1917	Canada	Food Controller	P. B. Tustin, Chairman
1919	New York State	Council of Farms and Markets	W. A. Dana, Chairman
1919	Spokane, Wash.	Chamber of Commerce	J. K. McCormack, Chairman
1919	Winnipeg, Man.	City Council	R. D. Hughes
1919	New York City	Private	I. G. Jennings
1919	New York State	Governor's Commission on High Cost of Living	Martin H. Glynn and John H. Finley
1919	New York State	New York State Recon- struction Commission (Committee on Food Pro- duction and Distribution)	Thomas V. Patterson, Chairman Herschel H. Jones, Secretary

1911-12, *Rochester, N. Y.* ("The Economic Problems of Milk Distribution in their Relation to the Public Health," by Dr. John R. Williams. Transactions of the Fifteenth International Congress on Hygiene and Demography, Washington, D. C., 1912.)

The studies in this survey were confined strictly to the City of Rochester, and were conducted entirely under the auspices of Dr. John R. Williams, of Rochester, at his own private expense. The time consumed in the investigation was over one year and a half, and a number of investigators were employed by Dr. Williams. Not only because this survey deals particularly with the City of Rochester, which is the subject of the main survey in our own report, but also because it was the first and by far the most comprehensive survey yet made of the cost of milk distribution and the unnecessary expenses connected with the same, it is desirable to consider the material in this report in some detail. It

will also be interesting to compare the conditions prevailing in 1911 with the conditions prevailing in 1919.

The first branch of Dr. Williams' study in Rochester consisted of a house to house canvass in 15 sections of the city, each containing from 100 to 700 homes. In all about 5,000, or about one-tenth of the homes in the city were visited. The results of this investigation are given in the table below :

TABLE No. 1
TABLE SHOWING THE USE OF MILK IN HOMES AND THE EXCESSIVE AND UNNECESSARY TRAFFIC
BY THE PRESENT DISTRIBUTERS

Section.	Class.	Number of homes.	Number of people.	Children under 5 years.	Amount of milk used daily (quarts).	Families using daily—					Families using—				Number of distributors in section.	Miles one distributor would travel in supplying section.	Miles present distributor travels in supplying section.		
						1/2 quart.	1 quart.	1 1/2 quarts.	2 quarts.	2 1/2 quarts.	3 quarts.	Certified milk.	Store milk.						
													Exclusively.	Partly.				Con- densed milk.	
1	Chiefly colored	231	1,128	67	245	51	122	10	24	11	6	11	4	48	165	23	2	20	
2	American laboring	523	2,308	159	532	131	242	21	67	18	..	23	30	70	432	55	3	45	
3	Do.	462	2,067	143	475	135	204	28	53	1	16	21	37	103	340	40	3	30	
4	Well-to-do.	283	1,176	67	398	35	132	27	61	26	14	1	10	4	273	27	2.6	24	
5	German-American laboring	527	2,647	224	626	117	231	41	80	36	39	2	8	6	28	508	39	4.4	61
6	Well-to-do.	115	518	19	169	12	57	9	24	1	11	5	..	..	120	14	1.2	12	
7	Italian laboring	643	3,172	538	388	218	143	26	26	1	8	18	52	25	29	353	51	3	36
8	Jewish laboring.	477	2,316	310	623	65	170	63	103	4	26	11	16	32	28	363	57	1.7	30
9	German laboring	234	1,245	94	289	37	90	33	39	1	16	..	10	..	5	145	39	1.7	20
10	American middle	450	1,939	112	523	92	217	39	66	..	21	8	4	..	13	443	26	2.4	48
11	Well-to-do	201	891	24	352	17	63	12	66	..	32	18	..	..	1	166	25	2.5	21
12	Do.	99	495	20	190	5	24	8	24	..	25	4	..	..	1	91	17	2	14
13	Do.	209	845	41	303	23	88	9	56	..	20	29	..	..	216	34	2.5	38	
14	American laboring	191	851	57	165	72	59	12	19	..	5	..	18	11	10	167	31	1.7	21
15	Do.	786	..	200	1,100	192	258	44	38	36	..	2	39	..	62	786	62	5.4	57

Attention is called to the fact that the proportion of children under 5 years of age is greater among the poor than among the well-to-do, and that the use of store milk and condensed milk is confined largely to the laboring classes, which, it is suggested, is due to lack of refrigerators or ice.

The most interesting part of this table shows the large number of milkmen going into each district. In section No. 4, 273 homes are supplied by 27 distributors travelling more than 25 miles, whereas one dealer could render the same service travelling not more than 2.6 miles. In section No. 8 are 57 distributors travelling over 30 miles supplying 363 homes, which could be served by one distributor travelling 1.7 miles. The report points out the great wastefulness of the present system of distribution, due to duplication.

Another important branch of this investigation consisted of a study of the cost of distribution. Information was secured from 173 distributors. Almost all, excepting half a dozen, had no accounting system, and approximate costs were arrived at by enquiry into the businesses. The results of this enquiry are shown in the following table:

TABLE No. 2

TABLE SHOWING THE TOTAL ACCOUNTING OF MILK DISTRIBUTERS
IN ROCHESTER, GROUPED ACCORDING TO THE
VOLUME OF BUSINESS DONE

Schedules.	Distributers selling daily—				Total.
	Not more than 150 quarts.	From 151 to 300 quarts.	From 301 to 1,000 quarts.	1,000 quarts or more.	
Distributers, number	25	101	44	3	173
Milk, retail, quarts.....	2,887	21,368	17,180	8,900	50,335
Milk, wholesale, quarts	129	2,411	3,415	6,000	11,947
Total milk sold, quarts.....	3,016	23,799	20,599	14,900	62,314
Men employed, number	29	133	99	95	356
Horses employed, number	34	160	101	65	360
Wagons employed, number	26	137	92	50	305
Length of route, miles	199	1,053	616	641	2,509
Customers, number	1,885	13,915	9,490	9,800	35,090
Value milk-room equipment.....	\$2,407	\$17,295	\$16,750	\$38,450	\$76,902
Value horses and wagons.....	8,815	45,105	28,495	25,035	107,450
Value real estate	..	..	..	96,700	96,700
Total investment	\$11,222	\$62,400	\$44,245	\$160,185	\$278,052
Interest, depreciation on investment. .	\$ 6.17	\$ 34.17	\$ 25.16	\$ 45.15	\$ 110.65
Cost of coal and ice.....	8.92	42.25	39.03	17.20	107.40
Milk shrinkage, waste, etc.	4.35	36.59	28.55	14.55	84.04
Maintenance horse and wagon.....	25.30	152.50	101.00	100.00	378.80
Daily wages, labor	5.60	48.95	74.20	193.06	321.81
Cost of bottles	7.38	77.36	74.89	21.00	180.63
Total cost distribution.....	\$57.72	\$392.82	\$342.83	\$390.98	\$1,184.35
Amount paid producer.....	128.71	999.55	880.44	886.40	2,895.10
Total cost to distributer.....	\$186.43	\$1,392.37	\$1,223.27	\$1,277.38	\$4,079.45
Milk receipts, retail	\$213.31	\$1,535.05	\$1,254.67	\$628.00	\$3,685.03
Milk receipts, wholesale	1.00	138.26	195.87	314.50	548.63
Cream receipts	6.75	60.84	106.20	67.51	241.50
Total receipts	\$220.06	\$1,734.15	\$1,556.74	\$1,366.01	\$4,876.96
Labor profit	\$37.59	\$341.78	\$333.47	\$78.58	\$791.42
Labor loss	3.96	..	..	..	..

The report points out that the above tabulation indicates that most of the milk distributors make only a very meagre living, in many cases the income being much less than that of laborers and unskilled mechanics.

The third branch of this investigation consisted in a most unique experiment to determine the cost of distribution under a single service system. It was assumed that an ideal delivery system would consist of one truck and a crew of men supplying one section of the city. Accordingly, an electric truck was furnished by an electric vehicle company having a capacity of 1,000 pounds. In place of milk, several pigs of lead which equalled in weight a load of milk were carried. Besides a driver there were two clerks supplied with apparatus for accurately measuring distance and time. There were two men who carried fictitious bottles of milk from the truck into the homes. Each was equipped with a steel basket similar to that used by milkmen containing 2 quarts and 3 pint milk bottles filled with water. Literature relating to the pure milk movement was deposited in the milk boxes of each house in place of milk, and notations made regarding conditions at the house which would equal in time the labor performed by the present milk peddlers. Each stop made by the truck was timed with a stop watch, and recorded. The distance travelled was measured by an odometer, and confirmed by map measurements. Each operation by the delivery men was measured and recorded upward of 200 times. Previous to the experiment a number of ordinary milkmen were timed without their knowledge to secure an average of the time occupied by them in going from the wagon to the house and return to it again. This experiment in milk delivery was conducted in the well-to-do district and again in one of the crowded sections of a poor district. The results of this experiment are recorded in the table on next page.

TABLE No. 3
TABLE—EXPERIMENT IN MILK DISTRIBUTION

	Streets.		
	Baden, Catherine, Vienna, Morris, etc.	Barrington, Dartmouth, Westminster Road. Rutgers.	
Families living in single houses, number.....	248	248	
Families living in double houses, number.....	202	52	
Families living in apartments, number.....	154	23	
Total families visited in section, number.....	604	359	
Houses having milk boxes, number.....	11	297	
Houses having no milk boxes, number.....	593	52	
Average amount milk used daily in homes, quarts.....	1.3	3	
Total amount milk used daily in section, quarts.....	785	1,077	
Total length streets in section, miles.....	1.6	2.5	
Distance travelled by truck in section, miles.....	1.7	2.4	
Distance travelled by present peddlers in supplying section, miles	30	38	
Stops made by truck, number	78	67	
Average time required to go from truck to each two houses, leave milk, and return to truck.....	H. m. s. 46	H. m. s. 62	
Total time of experiment	2 0 0	2 0 0	
Total time truck was in motion.....	34 45	40 2	
Total time truck was standing still.....	1 25 15	1 19 15	

In the first, or well-to-do section, the truck travelled 2.4 miles to supply milk which the regular milkmen were supplying in this territory by driving 38 miles. In the poorer section, the experimental truck travelled 1.7 miles to make deliveries which were being made by the local milkmen with a travel of 30 miles for the same work.

In the well-to-do district where families used an average of 3 quarts each it was estimated that 1,077 quarts of milk could have been distributed in 2 hours, while in the poorer district where the families used 1.3 quarts, it was estimated that in 2 hours the experimental truck could deliver 785 quarts. These figures represent the work of men physically untrained for active work.

As a result of the experiment, the author concluded that 1 truck drawn by 2 horses and manned by 3 men could deliver an average of 3,200 quarts of milk in 1 working day. As an example of the economy under this ideal system compared with the waste under the old system, the author quotes a number of instances in various districts of the city, among which is the following:

TABLE No. 4.

UNDER PRESENT SYSTEM	UNDER MODEL SYSTEM
29 men at \$1.16 per day.....\$33.63	3 men at \$2.50 per day..... \$7.50
34 horses and 26 wagons, maintenance 26.00	4 horses, daily maintenance..... 5.00
	1 truck, maintenance 25
	1 motor truck, part of day..... 2.00
	Superintendence 6.00
Total.....\$59.63	Total.....\$20.75

After quoting several other instances, the author compares the present cost of distribution for the entire city of Rochester with the proposed cost of distribution under a model system of distribution:

TABLE No. 5

UNDER PRESENT SYSTEM	UNDER MODEL SYSTEM
356 men, and in many cases their families.	90 men.
380 horses.	50 horses.
305 wagons.	25 horse-drawn trucks.
2,509+ miles travel.	300 miles travel.
\$76,600 invested in milk-room equipments.	\$75,000 equipment for sanitary plant.
\$108,000 invested in horses and wagons.	\$30,750 equipment of horses and trucks.
\$2,000 present daily cost of distribution.	\$600 estimated daily cost of distribution.
\$720,000 yearly cost of distribution.	\$220,000 estimated yearly cost of distribution.

and comes to the following conclusions:

"There is little question that if the milk supply of Rochester were to be distributed by one agency properly organized and equipped, a saving to consumers of at least \$500,000 yearly could be effected."

In order to bring more vividly before the minds of the readers the enormous waste of the competitive system of distribution, the author appends a series of illustrations showing the number of milk wagons at present engaged in distribution in the several districts of the city, and makes the following suggestion:

"The City of Rochester owns its water works, collects its own ashes, operates an incinerating plant for the sorting and disposal of garbage and controls the collection of its garbage. All of these activities bear an important relation to the public health, but none the less does milk. Why, therefore, should not cities control their own milk supplies to the end that the people may have pure, wholesome milk at the same minimum cost?"

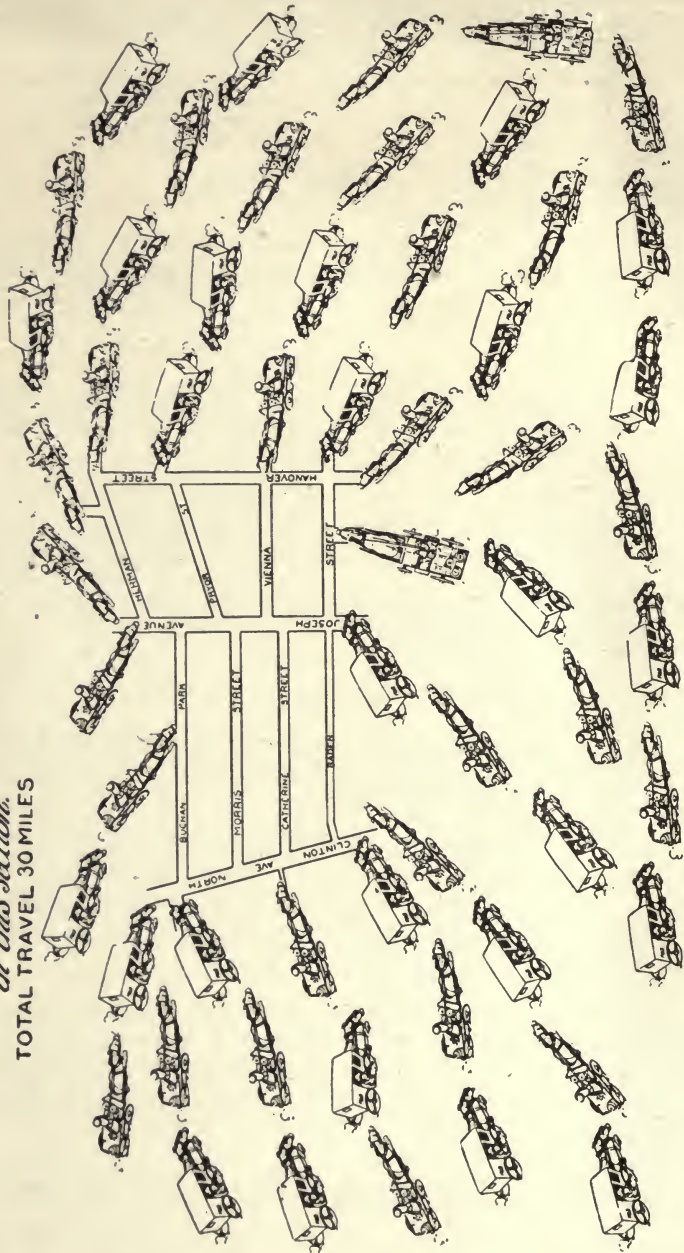
One example of these illustrations is given on the opposite page:

TABLE No. 6

57 Milk Peddlers
for 363 Homes

up this section.
TOTAL TRAVEL 30 MILES

THIS SERVICE COULD BE RENDERED BY
ONE DISTRIBUTOR IN A TRAVEL OF 2 MILES



"57 Milk Peddlers for 363 Homes in this Section."

1915, *Detroit, Mich.* (U. S. Department of Agriculture, Bulletin No. 639. "The Market Milk Business of Detroit, Mich., in 1915," by C. E. Clement and C. P. Warbor.)

The data was collected during the months of September and October, 1915.

The methods of enquiry consisted of an examination of the dealers' books and an inspection of the business.

The subjects covered included: Statistics of the supply, cost of collection in the country, cost of handling in country stations, investment in the country, freight, investment in city plants, investment in delivery equipment, average daily sales, cost of handling in city plants, cost of delivery labor, cost of delivery expense, loss on surplus.

This report is most interesting because of numerous tables showing the different costs. It points out that previous to the adoption by the City of Detroit of a milk pasteurizing ordinance there were 158 retail dealers, and three months after passing of the ordinance there were only 68 plants in which milk was prepared for distribution.

The chief recommendations are that country plants be standardized in building and equipment, and that there is economy in the sale of milk from city stores.

1916-1917, *New York State.* (New York State Assembly Committee; Senator Chas. W. Wicks, Chairman.)

This survey occupied a period of about six months under an appropriation of \$25,000.

Methods of enquiry included: Public hearings, at which witnesses were examined representing dealers, producers, and consumers; examination of dealers' books by expert cost accountants, and of producers' accounts.

Subjects covered included especially the milk supply of New York City; the statistics of the supply; investment in the country; freight; investment in city plants; investment in delivery; average daily sales; cost of handling, labor; cost of delivery, other expenses; loss on surplus; and also a study of dairy farm costs, including cost of labor, cost of feed, other farm expense; and prices charged consumers.

Figures were obtained from all of the larger milk companies in New York City, and from many dairy farms. The report shows that the increase in cow population in New York State has failed to keep pace with the increase in human population.

The Committee concludes that:

"During a period of several years the dairy farmer, laboring industriously and thriftily as he might, was not able to secure such reasonable price from the sale of dairy products in this State as to earn a fair labor and invested capital return. The Committee is constrained to believe that the average dairyman is as thrifty and

efficient in his chosen pursuit as the average man in other walks of life. We doubt if there is any group of men in any corresponding industry so well informed as to their craft, so keenly interested in its progress, and so eager for success as the dairy farmers of the State of New York."

The Committee's investigations included dairy farms producing milk for the City of Rochester, and milk companies distributing milk in the City of Rochester.

The conclusions of this Committee regarding distribution are expressed as follows:

"UNNECESSARY COSTS OF DISTRIBUTION"

"This business is conducted on an extremely competitive basis. * * * A large part of the cost arises from the bitter competition existing in the distribution of the product * * * An army of solicitors and sales agents are maintained * * * Overhead charges attributable to this work amount to an alarming sum * * * It is customary to refer to the fact that four or six or ten milk wagons and milk drivers visit the same block * * * but this ignores the really greater expense of the silent army of retainers * * * Not only do we find in single blocks these wagons and horses, but on the same block six solicitors; six route superintendents; six staffs of clerks and bookkeepers. The distribution of milk is a public service which, to be put upon an economic basis, requires public regulation to the end that all unnecessary services even of a competitive kind may be eliminated."

"DISTRIBUTION OF MILK SHOULD BE A REGULATED PUBLIC SERVICE"

"It is safe to assert that the consumers in the City of New York pay several millions of dollars annually for the privilege of having all the numerous purveyors of this necessity of life engage in attempts to serve him * * * A milk supply is as much a daily necessity and even more so than gas or electricity."

"It certainly seems as if the dairymen of this State and the distributors with their invested capital, and the consumer, should co-operate to the end that these unnecessary competitive wastes be eliminated and the dairymen's milk brought to the consumer at the lowest possible expense."

"The investigations of the Committee lead to the conclusions that under the present competitive system it takes almost as many men to bring the dairymen's milk to the consumer as there are dairymen engaged in the production of milk with all their employees. This is the result of the purely competitive basis upon which the business is handled. Three or four milk stations are being maintained with a separate force of employees to collect or receive the dairymen's milk at many points where one well equipped station with a competent force could do all the collecting at one-fifth the present expense. This unnecessary duplication of service follows with all its attendant overhead and capital investment from the country milk station until the bottle of milk is finally deposited at the consumer's door. A large part of this, in the judgment of this Committee, could and should be eliminated. * * * The only solution possible is to limit and leave only those in the field which the service actually requires. This is just as obvious in the case of milk as it is in gas or any other daily necessity supplied in small quantity to the consumer.

"It is believed by the Committee that a State Department * * * should be created to provide ways and means * * * to consolidate this service, not only

in New York, but in every city of the State, to the end that the expense thereof be reduced to a minimum * * * The dairymen of the State, ignoring and disregarding the law has so organized as to protect his own interests * * * Those who contend that these matters had best be regulated by the law of supply and demand pay no heed to the evident situation that the law of supply and demand has absolutely ceased to operate.

"THE MILK TRUST"

"There is no milk trust controlling the purchase and sale of market milk in the City of Buffalo. There is none in Rochester; there is none in Syracuse; there is none in Utica; there is none in Albany; nor in any city between Albany and New York, nor in any town or village of the State. There is no milk trust controlling the purchase and sale of milk in the City of New York. Instead there is sharp and bitter competition, so far as the records of this Committee discloses, in each and every one of the places. There are four stations in many places where one could collect the milk. There are four outfits of station managers and employees in many places where one could do the work. Every intelligent person who has ever discussed the question concedes that there are four horses and wagons, four or five or six groups of solicitors; four or five or six separate organizations and overhead charges duplicating work that one of each could well perform.

"There is too much capital already invested in the business * * * Here, then is the waste and the loss * * * Instead of introducing more expensive competitors in the field to waste more money of the consumer, the State should endeavor by judicious legislation, to permit the elimination of all unnecessary investments both of labor and capital and effectively control the business operations of the remainder."

1917, *Berkeley, Cal.* (University of California, College of Agriculture, Circular No. 175. "Progress Report on the Production and Distribution of Milk," by Elwood Mead.)

The information in this survey was obtained during the months of June and July, 1917.

The methods of enquiry consisted in the mailing of questionnaires to producers and dealers, and an inspection of the dealers' milk factories and of dairy farms.

The subjects of enquiry included: Statistics of the supply (of the cities of San Francisco, Oakland, Berkeley, Alameda, and Richmond); average daily sales; losses on surplus; dairy farm costs; cost of labor, feed, other farm expense; prices paid to farmer; prices charged consumers.

The conclusions of this survey are:

"(1) The distributors service at present is badly organized, and there is in many cases a serious waste of labor and money which ought to be corrected;

(2) Duplication of pasteurizing plants in a needless addition to distribution costs."

Under recommendation the report states:

"(1) What is needed is comprehensive and expert public oversight that will study the needs of a city as a whole and co-ordinate the work of producers and distributors so as to eliminate inefficiency and waste, and insure prices based on the value of the services rendered;

(2) What is needed in San Francisco Bay cities is the creation of some expert authority to study whether the present location of our dairying districts makes possible the provision of a milk supply as cheaply as it could be furnished from some other district or districts where land is cheaper even if farther removed.

(3) The economies of distribution should be studied, not to determine in what direction the distributors have failed, but what could be saved by a carefully planned distributing system which would eliminate duplication of routes, needless pasteurizing plants, and overhead charges."

1917, *New York City*. (Report of Mayor's Committee on Milk; Dr. Charles E. North, Chairman.)

Methods of enquiry included: Public hearings of dealers, producers, consumers; examination of dealers' books by expert cost accountants; examination of dairy farm costs by cost accountants; questionnaires to dealers, producers and consumers; field work by farm inspectors on farm costs; by city inspectors in house to house canvass.

Subjects of enquiry included: Statistics of New York City supply; cost of freight; dairy farm costs, including the cost of labor, cost of feed, other farm expenses; country hauling; prices received by the farmer; milk dealers' costs, including investment in the country; investment in the city; average daily sales; cost of handling, labor; cost of handling, other expenses; cost of delivery, labor; cost of delivery, other expenses; loss on surplus.

The house to house canvass covered 2,200 homes by 250 investigators, including a population of 12,439 people, showing the milk consumed by children of different ages and by adults.

This survey included studies of the cost of production on dairy farms in all the states shipping milk to New York City, and on the city end of the line a careful study of the cost of distribution of milk in quart bottles from retail wagons, of the sale of bottled milk from grocery stores and milk stores, and the sale of wholesale milk in cans. The investigation gave much consideration to the food value of milk and received the testimony of the leading authorities on this subject. The conclusions of this survey were:

"1. Milk is the most valuable and the cheapest of human foods even at present prices.

2. For drinking purposes New York City now uses only about 700,000 quarts daily. The city should use about 2,000,000 quarts daily for drinking in an ideal diet.

3. The cost of milk production at present prices is 7 cents per quart and the prices asked by the Dairymen's League are justified.

4. The cost of distribution as shown by the dealers' accounts is justified and not large enough to prevent business losses.

5. The cost of production can be reduced by
 - (a) eliminating low-producing cows.
 - (b) collective hauling of milk.
 - (c) collective buying of grain.
6. The cost of distribution can be reduced by abolishing competition and duplication through centralizing the distributing system into a single company or public service corporation."

1917, *New England*. (Boston Chamber of Commerce. "The Milk Question in New England," R. W. Bird, Chairman; Dr. A. C. Gilbert, Secretary.)

The methods of enquiry included an audit of the dealers' books by expert cost accountants, and the examination of dairy farm costs by farm inspectors.

The subject of enquiry included: Freight, the cost of handling, the cost of labor, and factory cost, loss on surplus, and dairy farm costs, including labor, feed, other farm expense; country hauling, and a statement of prices received by the dairy farmer.

The Committee's recommendations include:

"1. That the farmers through their association or community groups establish their own delivery system from the farms to the railroad shipping station, and wherever possible own their own receiving stations at the railroad.

2. The question of surplus (milk) is one of the most aggravating causes for the high price of milk to the consumer. The farmer should study this condition carefully and endeavor to bring his cows to a producing state in a more uniform manner than at the present time, because if he does not the loss due to surplus must ultimately be borne by those who produce it and not by the consumers as at present."

The recommendations to milk dealers include among the others:

"That early morning deliveries be discontinued and that all deliveries be made by daylight;

That all bottles be charged for, and credited when returned;

The use of a standard blank bottle."

The Committee confesses its inability to express an opinion on the subject of co-operative or centralized milk delivery.

1917, *Pennsylvania, Maryland, Delaware*. (Report of the Governor's Tri-State Commission; Bulletin No. 287; Pennsylvania State Department of Agriculture, Dr. Clyde L. King, Chairman.)

Methods of enquiry included: Public hearings, at which appeared witnesses representing dealers, and consumers; questionnaires addressed to dealers and producers.

The subjects covered included: Statistics of the milk supply of Philadelphia, Pa., Wilmington, Del., and Baltimore, Md.; the cost of handling at country milk stations; freight: delivery charges, labor; de-

livery charges, expenses; and the cost of milk production on dairy farms, including labor, feed, other expenses; and country hauling.

The report gives consideration to the food value of milk and the sanitary character of milk, and also to the surplus problem. It includes many tables and diagrams of great interest to students of this subject. Among the most important conclusions and recommendations are the following:

"On costs of production, the Committee recommends:

- (1) Keeping only high producing cows;
- (2) Co-operative methods of hauling milk."

Under distribution the chief recommendations are that:

"Milk distributive plants be hereafter regarded as quasi public businesses, and subject to governmental regulation;

The cost per quart for pasteurizing milk, including the investment for plant and operating costs, decreases with increase in the size of the plant and in the amount of milk handled.

There are economies in route service certainly up to the point as heavy as one vehicle can serve. Herein lies the greatest economy in large scale service.

There is much saving in overhead charges.

The public is interested in the milk distribution business as a public utility not only because of the economies in large scale distribution, but also because competition, as in railways and other public utilities, is ruinous if real, and worthless as a price protector to farmer and consumer if unreal.

The price of milk is as vital, certainly, as the charges for common carriers, or for electricity, or gas, or street railways.

The sanitary safety of milk is certainly as vital as, if not more vital than, the sanitary safety of water.

The price for milk depends largely upon the economies in production and milk distribution. Milk is a food that is absolutely requisite for babies and growing children.

We have given careful consideration to the alternatives to recognizing the milk business as a quasi public business. Among these alternatives are:

- (1) Public ownership of pasteurizing plants in order to give equality of economic opportunity to the small dealers;
- (2) Co-operative retail delivery by dairymen;
- (3) Public ownership of the milk distributing plants; and
- (4) Farmers' stations within the city for co-operative wholesale milk delivery."

The subject is summarized by the statement that:

"The Commission recommends that the milk distribution business be regarded as a public utility."

1917, *Canada*. (Report of the Milk Committee Appointed by the Food Controller for Canada to Investigate Milk Supplies for Urban Municipalities; Ottawa; November 24, 1917. P. B. Tustin, Chairman.)

Methods of enquiry included public hearings of witnesses representing dealers and producers, and questionnaires addressed to dealers and producers.

The preliminary statement by the Food Controller says:

"Although any action taken by the Food Controller must necessarily be limited to the period of the War Measures Act, the Committee's recommendations have in view more than temporary relief from the excessive spread between the prices paid to the producer and the prices charged to the consumer. The report is being given widespread circulation in the hope that thereby a permanent solution may be found of the problem of reducing the high cost of distributing milk."

The subjects of enquiry included: The cost of milk production, farm labor, cow feed, and other expenses; the use of milk in by-products; the food value of milk; the spread in various cities; bottle losses, and possible savings.

The report also contains a statement of the experience of the City of Regina, Sask., in consolidating the milk business.

The conclusions and recommendations of this report are, in brief, as follows:

"(1) That the price of milk paid to producers generally has not been found to be exorbitant, taking into consideration all existing circumstances;

(2) It has been proved successfully that milk and all its products, including skim milk, are the cheapest forms of animal foods on the market today, and that the price of milk has not increased to the same extent as have the prices of other food.

(3) The producer received for his milk delivered at the city dairy an average price of from 6c to 8c per quart, while the retail consumer is paying from 10c to 13c per quart. This difference, commonly called "the distributors' spread," varies, according to the evidence submitted, from 2.75c to 6.50c per quart.

(4) That this excessive "spread" or difference between the producers' price and the consumers' price is caused chiefly by the excessive number of distributors, and that it varies in about the same ratio as the number of distributors.

(5) In Ottawa, where one dairy handles about 75% of the milk, the spread is only 3.25c per quart, while in Toronto where there are about 90 distributors it is 5.25c."

The report estimates possible savings as follows:

Excess dairy costs.....	.25c per quart
" delivery costs	.75 " "
" bottle loss costs.....	.125 " "
Total	1.125c " "

and on this basis an annual saving of over \$1,500,000.00 could be effected in city distribution in Canada.

The second chapter of the report contains recommendations for the reorganization and unification of the business of milk distribution. The principal recommendations are as follows:

"(1) We recommend that the distributors' "spread", or the difference between the price paid for milk delivered at the city dairy and the price charged to the consumer, be fixed on a basis of reasonable costs of distribution as shown by the evidence submitted."

Following the suggestion that the Dominion be divided into zones, the report states:

"We recommend that based upon present conditions the following maximum spreads be fixed, and made effective December 1, 1917, subject to reduction when conditions warrant:

British Columbia	5.25c per quart
Alberta	5.25c " "
Saskatchewan and Manitoba	5.25c " "
Ontario and Quebec.....	5.00c " "
Maritime Provinces	5.00c " "

In Ottawa, a city of 100,000 population, 75% of the business was shown to be in the hands of one distributing firm, which operates on a spread of 3.25c per quart. This illustrates the advantages to be obtained by the single unit delivery system. * * * The manager of the firm stated that under a single delivery system, he could reduce the "spread" to 3c.

We recommend that where the Provincial Committee decides that economic waste could be eliminated or reduced by reorganization, such reorganization should be carried out by three competent men as local commissioners, selected by and coming under the approval of the proper authorities; one representing producers; one representing distributors; one representing consumers. The local commission thus constituted should proceed to reorganize and consolidate the milk business."

The following plan is suggested for the reorganization and consolidation:

"1. The most efficient plants and equipment should be selected;

2. The property comprised in the consolidation should be appraised by two valuers, one appointed by the Food Controller, and one appointed by the owner.

The results of such proposed reorganization would be:

- (1) A reduction in price to consumers;
- (2) One management, one bookkeeping system, reduction in overhead charges, release of a large number of men;
- (3) Saving in charges for supplies in large quantities, including producers' supplies;
- (4) More sanitary quality of milk;
- (5) A great saving in heavy expenditures for the prevention of the spread of tuberculosis resulting from the absolute prohibition of the sale of milk from cows that have not been tested and found free from tuberculosis, unless it was safeguarded by pasteurization;
- (6) Infant mortality would be reduced;
- (7) Typhoid and other preventable diseases would be reduced;
- (8) Inspection and control of the milk supply by municipal authorities greatly facilitated."

1919, *New York State*. (Report submitted to the Legislature of New York State at Albany, April 18, 1919, under the title: "Preliminary Report of the Council of Farms and Markets of its Investigation of the Cost of Production and Distribution of Milk in New York State." W. A. Dana, Chairman.)

Methods of enquiry included: Public hearings of witnesses representing producers and dealers; examination of dealers' books by cost accountants; questionnaires addressed to producers and dealers.

The subjects of enquiry included: A study of the milk supply of the cities of Glens Falls, Syracuse, Utica, Binghamton, Poughkeepsie, Middletown, Watertown, Albany, Olean, Batavia, Lockwood and Jamestown, N. Y. In some cities complete information was obtained. In other cities, partial information.

Complete records and costs of milk production were secured from thirty representative agricultural regions surrounding Syracuse, Canton, Middletown, Binghamton, Watertown, Utica, Poughkeepsie; including cost of feed, labor, and other dairy costs.

Statistics of the cost of distribution from 26 distributors in Utica, Syracuse, Binghamton, Batavia, Lockport, Watertown, Middletown, Jamestown, Poughkeepsie, were obtained, including the cost of operating milk plants and milk delivery systems.

The conclusions and recommendations of this report, briefly, are as follows:

"(1) The Council is firmly of the opinion * * * that the producers generally have not been making any large profits;

(2) That in nearly every city there are too many dealers and that there is a large duplication of routes, several wagons serving customers in the same block;

(3) The problem of surplus has also been an acute one;

(4) That the overhead on account of an expensive plant and a large amount of capital is so great that no company, even though handling practically all of the milk of the city, could show a large profit with such an overhead;

(5) That the entire system of distribution in the up-State cities should in some way be made more efficient.

(6) It has been advised that * * * the cost of distribution in Philadelphia has been reduced to approximately 4.5c;

(7) That in the City of Ottawa it has been reduced to about 3.5c;

(8) The evidence indicates that the spread of about 5c per quart between the cost of milk at the city distributing plant and the prices received for retail milk would cover the cost of bottling and distribution in these cities under present conditions.

1919, *Spokane, Wash.* (Report presented to the President of the Chamber of Commerce by a special Committee called "The Milk Committee appointed by the Chamber of Commerce," dated April 25, 1919.)

Methods of enquiry included: Questionnaires addressed to producers and dealers; field work, including inspections of the producers' and dealers' businesses.

Subjects of enquiry included: Statistics of the supply of Spokane; losses on surplus milk; per capita consumption; food value of milk; milk prices compared with other food; and the cost of production and of distribution.

The conclusions and recommendations include the following:

"We conclude that the producers as a class are losing money in their dairy activities at the present time * * * that they have not as a class been making an adequate return for the investment, risk, and work necessary to produce milk, and that they are entitled to a better price than they are now receiving if production and the dairy industry are properly encouraged;

That we find many of the producers unskilled in the proper handling of the herd, using cows which have no place in the dairy herd, using unintelligent feeding methods, quite a few without any knowledge of cost accounting;

We conclude that the consumer has not a sufficiently full knowledge of the value of milk as a food and its positive necessity especially for the younger generations * * * and that the price of milk has been increased less during the war period than any other food product.

We conclude that in the distribution of milk the distributor has made no more than a modest profit, and we believe the distributors are not making any unusual or improper profit in the spread between the price they pay to the producer and the price at which they sell to the consumer.

We find most of the large distributors with side lines of activity which we believe are profitable, such as making ice cream and butter.

If any relief is to be had, it must be through the concentration of agencies.

It occurs to us that the overhead cost of maintaining so many agencies is the chief contributing cause of the cost to the ultimate consumer.

It has been suggested that a municipal plant be installed * * * but we believe that this would not bring the results hoped for on account of the peculiar nature of the business.

Neither do we believe that any organization by the producers through which they will market their milk direct will be successful.

Some members of your Committee have believed that the situation could be met by licensing by the city a monopoly in the hands of private capital * * * retaining the power through the city commissioners of audit and control of prices and profits, as well as of methods and expenses.

Should such a monopoly be desired by the public (which should be consulted before any definite plan is adopted) we believe that in justice to all present vested interests, those particular distributors who were forced to discontinue should not suffer loss, but their properties should be paid for at a sound and solvent price, either through the monopoly thus created, or by direct tax, as it would not seem fair to confiscate their properties or their business without a reasonable payment. * * * If the city reserves the licensing power; the absolute control of all milk and of milk products sold in the city; the control of a proper and fair profit which the monopoly would be allowed to make; requires frequent reports and also makes frequent audits of accounting of such monopoly; we believe the very best results could be obtained, for both the producers and the consumers, in economy and in qualities. The prices could be changed as conditions changed.

The monopoly distributor should be allowed to make a stipulated return on his investment * * * and the consumer should in such case feel that he was getting as much as his money should buy without any unusual or unfair middle-man's profit.

The objection to this plan which seems fatal is that the public, in our judgment, would not be willing to allow such a monopolistic distributor a fair profit for his investment, energies and efforts, and would attempt to confine him to a rate of 7% or, perhaps, 8% on his invested capital, with only modest salaries, and in this way would destroy the initiative, as private capital does not ordinarily like to go into a hazardous business where the possibilities of profit are so limited.

If private capital could be obtained from sufficiently public spirited individuals to be and remain indifferent as to profits above a nominal rate, such a plan could be worked out."

1919, *Winnipeg, Can.* (Report made to the Mayor and Common Council of the City of Winnipeg, dated April 8, 1919, by L. D. Hughes.)

Methods of enquiry: These were limited to an inspection of the dealers' business and accounts.

The subjects of enquiry included: Statistics of the supply; dealers' investment in plant and buildings; cost of handling; cost of delivery; average daily sales; loss on surplus; sanitation of dairy farms and milk dealers' plants.

The report recommends that a commission of three members be appointed to act as a city milk commission, one member to be elected by the producers, one to be elected by the Winnipeg Trades and Labor Council, and one elected by the Greater Winnipeg Board of Trade. In addition, one member of the City Council, and one member of the City Health Department should be appointed ex-officio members, and attend all meetings of the commission. The duties of the commission would be to appoint a manager for the municipal milk plant, and to set the price of milk paid to the producer and the price paid by the consumers from time to time.

The summary and conclusions of the report include the following:

"In my opinion the only way in which the City of Winnipeg can enter into the retail milk business in a manner satisfactory to the city, the producers, and consumers of milk, is to obtain a monopoly of the business within the limits of the City of Winnipeg.

"I would therefore recommend that the City of Winnipeg purchase the milk businesses of the existing companies.

"The following out of this plan would enable the city to erect the most modern type of building on the continent. The annual saving effected by following the above plan would be \$230,348.00."

The report then discusses the suitability of existing plants, and presents figures showing the capital invested by two of the largest companies, and a tabulation showing present costs of distribution, and annual savings to be effected by the monopoly, and also the estimated cost of building and equipping a new municipal milk plant. It concludes as follows:

" * * * the milk consumers will be able to obtain pure milk at the lowest possible price.

Infant mortality would be reduced. Tuberculosis, typhoid, infant diarrhoea, and other communicable diseases * * * would be reduced to a minimum.

The impetus given the dairy business as a result of the producers having a voice in the setting of prices * * * would build up a prosperous dairy community surrounding the city.

Inspection by officers of the department of health would be greatly facilitated, as all milk coming to one plant before being retailed to consumers could be thoroughly inspected."

1919, *New York City*. ("A Study of the New York City Milk Problem," published by the National Civic Federation, by I. G. Jennings.)

Methods of enquiry: Questionnaires to dealers.

Subjects of enquiry: Prosecution of milk dealers by New York City Department of Health; inefficiencies of production; profitable and non-profitable cows; volume of milk produced on dairy farms; inefficiencies in the delivery of milk; country hauling; city retail delivery; sanitary control; bacterial tests; payment of premiums to the producer; country laboratories; regulation by state commissions; legal status of a state commission; public ownership of the milk industry.

This report suggests the appointment of a state commission and municipal ownership of the milk business, and submits evidence indicating that a state commission could be appointed under the police powers of the state with such legal powers as would permit the licensing and regulation of the milk industry, and the fixing of prices; and that municipal ownership also could be made legal under the state constitution. The greater part of the report is devoted to a detailed discussion of legality of a state milk commission and of municipal ownership. The author quotes authorities and precedents and apparently establishes satisfactory legal authority for the institutions mentioned.

1919, *New York State*. In a report published August 25, 1919, entitled, "Preliminary Statement of the Commissioners appointed by Governor Smith to report to him in the matter of the High Cost of Living," signed by Martin H. Glynn, late Governor of the State of New York, and Dr. John H. Finley, Commissioner of Education, being special commissioners appointed by the Governor, the Commissioners devote the main body of the report to the milk problem.

They point out the numerous investigations which have been made, and say:

"Despite all these investigations, the price of milk has rapidly risen since 1916, and from present indications it is likely to go still higher during the coming winter."

The report calls attention to the variation in prices in different cities, although the prices paid to the producers are approximately the same, and especially that the price of milk in Philadelphia is 2 cents a quart cheaper than in New York City.

Regarding the importance of milk to the community, the Commissioners say:

"If milk were a mere commodity without which human beings might live in health and vigor, the State of course would have little concern in this transactions, but since in every community there are many persons, especially children, mothers, and invalids, for whom it is as much a necessity of life as a supply of pure water, the State has not only a rightful reason for enquiry as to whether there are exorbitant profits in its sale, but a compelling reason for interfering if there are."

Their recommendations include the following:

"We further recommend that you require all district attorneys of the State of New York, as you have already required the district attorney of New York County, to give immediate and most diligent attention to any violation of existing laws within their respective districts."

"We are disposed to put the emphasis for the present on bringing about such open co-operation between dealers and consumers as will insure a fair price. To that end we recommend, therefore, that you cause to be appointed first of all in New York City a fair milk price committee consisting of nine members: The State Commissioner of Health, the New York City Commissioner of Health, the New York City Commissioner of Markets, three members to be named by the Governor of the State, three members to be named by the Mayor of the City of New York. We further recommend that you follow this plan in the formation of the milk committees in other cities of the State. upon the request of the local officials.

"If this plan should, however, be found ineffective in securing fair prices, we would then be prepared to recommend * * * the following as the nucleus of a tentative legislative program for placing the distribution of milk on a public utility basis.

"1. That there be created a State Milk Commission to regulate the milk distribution business in cities of the first and second class.

2. That all milk distributors in cities of the first and second class be required to secure a license from the proposed Commission, and such Commission be authorized to refuse a license to any distributor who can not establish proof that the business he proposes to conduct is of public interest.

3. That the proposed Commission be given full power to regulate the rates which shall be charged on milk for the service rendered by the distributing agencies, and to limit the profits of such agencies to what it may deem to be a fair and reasonable return on the investment.

4. That the proposed Commission be given full authority to require the installation of uniform cost accounting systems by all distributing agencies in first and second class cities, and to inspect and audit such accounts at any time.

5. That the Commission aid and assist all municipalities desiring to establish municipally owned distribution of milk and act as an advisory board and be in position to recommend the most effective method to be used in establishing municipal distribution of milk, including the acquisition of privately owned distributing systems.

6. That all the municipalities of the State be authorized to acquire and operate milk distributing systems within their boundaries when such acquisition and operation are approved by this Commission.

7. That the proposed Commission promote co-operation between the producing and distributing elements of the milk industry; that it make from time to time investigation of the cost of producing milk, and publish for the information of the

public data as to volume and cost of production in this State; that it conduct educational campaigns for promoting the wider use of milk as a food and co-operate with municipal health departments and other agencies in making special studies of the needs for the greater use of milk in the feeding of children.

8. That the Commission make special study of the problem of providing milk at a minimum cost to the children of the poorer sections of the larger cities, and co-operate with the municipal departments of health in providing milk for the feeding of infants at the lowest possible cost.

9. That the Commission co-operate with the New York City Department of Health to make a special study of the conditions under which loose milk is sold in the city, and endeavor to eliminate all possible danger of contamination of milk sold in this manner.

10. That the proposed Commission be empowered to revoke a dealer's license for due cause after public hearing and after due notice in writing.

11. That any municipality in addition to cities of the first and second class may by formal action of the governing body of the municipality place themselves under the jurisdiction of this Commission."

1919, *New York State*. The Reconstruction Commission of the State of New York was appointed by Governor Alfred E. Smith on January 21, 1919. It consists of thirty-six members, representing all of the large cities of the State of New York; these are divided into two general committees, and nine special committees dealing with the various public problems and readjustments following war conditions.

Among these is a Committee on Food Production and Distribution, consisting of ten members, of which Mr. Thomas V. Patterson of New York City is chairman. This Committee have given much study to the milk problem, and drawn up a draft of recommendations to the Governor for state legislation, which is as follows:

"1. That the distribution of milk be considered a public utility to be controlled and regulated as such.

2. That legislation be enacted authorizing the formation of trade associations and consolidation of food businesses, subject to public control as our other public utilities of the State.

3. That all dealers in cities of the first and second class be required to secure a license and that the regulating authority be authorized to refuse a license to a dealer who cannot establish proof that the business he proposes is to be conducted in the public interest.

4. That the regulating authority have the power after a public hearing and proper notice in writing to revoke a dealer's license for due cause.

5. That the provisions of the law at present relating to licensing in this industry be amended to avoid conflict.

6. That the regulating authority be given full power to regulate the rates which shall be charged in the sale of milk for the service rendered by the distributing agencies and to limit the profits of such agencies to what it may deem to be a fair and reasonable net return on the investment.

7. That the regulating authority be empowered to regulate the methods of handling all milk and that it be its duty to recommend whatever measures are necessary to accomplish economies, mechanical or otherwise.

8. That municipalities be authorized to acquire and operate milk distributing systems within their boundaries when such operation is approved by the regulating authority.

9. That the regulating authority be empowered to apportion territory for distribution among competing companies when such apportionment would result in greater economy.

10. That municipalities other than those of the first and second class may, by formal action of the governing body of the municipality, place themselves under the jurisdiction of the regulating authority.

11. That the regulating authority maintain offices in each of the cities under its jurisdiction in order to carry out its functions effectively."

PLAN AND SCOPE OF THE ROCHESTER SURVEY

METHODS OF ENQUIRY.

These methods included the following:

(1) PUBLIC HEARINGS.

Public hearings of witnesses representing milk producers, milk consumers, and the investigators employed by the survey: (Twenty-two hearings in all were held, covering the period from July 8th to December 1st.) The stenographer's notes and exhibits were used as material in preparing this report.

(2) EXAMINATION OF BOOKS OF DEALERS.

(The accounts of five of the largest dealers and 15 of the small dealers were examined by the expert cost accountants employed by the survey. Accounts of only four of the large dealers were sufficiently accurate to justify detailed tabulation. All of the others were so incomplete that they could be used only as a basis of estimate.)

(3) QUESTIONNAIRES.

Questionnaires were sent to the following:

- (a) To milk dealers on hauling and freight.
- (b) To milk dealers on the volume of milk purchased and sold.
- (c) To milk dealers on valuation of properties.
- (d) To milk producers on country hauling.
- (e) To milk dealers of all large cities in the United States and Canada on spreads, as well as prices and quantity of milk pasteurized.
- (f) To health officers of all large cities for milk statistics and milk regulations.
- (g) To health officers of all cities in New York State on prevalence of human tuberculosis.
- (h) To institutions in Rochester on milk purchased and milk used.

(4) FIELD WORK.

(a) Inspection of milk dealer's business; volume of business transacted; volume of work for each operation; number of men employed; number of hours of labor.

- (b) Inspection of dairy farms to determine farm costs; personal interviews with producers with notes on annual costs of production.
- (c) Sanitary inspection of dealers' milk plants in city.
- (d) Sanitary inspection of dairy farms in the country.
- (e) House to house canvass in the city to determine quantity of milk used, and uses of milk by consumers.
- (f) Weighing and measuring of school children to determine under-nourishment.
- (g) Inspection of costs of distribution in the City of Ottawa, Canada.
- (h) Inspection of the costs of distribution in the City of Philadelphia.
- (i) Inspection of costs of distribution in the City of Baltimore.
- (j) Inspection of operation of Price Fixing Commission in the City of Detroit.

(5) SPECIAL STUDIES.

- (a) Work performed by previous milk surveys and by milk commissions.
- (b) Work performed by the Rochester Health Department and of Rochester milk regulations compared with milk regulations of other cities.
- (c) Infant milk depots.
- (d) Undernourishment in school children, and dispensing of milk, and school lunches.

II

SUBJECTS OF ENQUIRY

The subjects of enquiry in their order are as follows:

1. General Introduction.

- (a) Resolution by Common Council of April 22, 1919, authorizing the milk survey.
- (b) A survey of previous milk surveys; their organization, scope; recommendations, and results.
- (c) Plan of present milk survey, its organization and scope.

2. Statistics of the Rochester milk supply.

- (a) Producers.
- (b) Dealers.
- (c) Milk sales.

3. House to house canvass to determine milk used by consumers.

4. Weight and height of school children to determine percentage and degree of undernourishment.

5. Milk supply of institutions to determine per capita consumption.

6. Food value of milk for children and adults; commercial value and public health value compared with other foods.

7. Relation of milk to infant mortality.

8. Cost of producing Rochester milk.

- (a) Inspection of Rochester farms.
- (b) Cost accounts for total supply.
- (c) " " " small producing cows.
- (d) " " " large producing cows.
- (e) " " " small herds.
- (f) " " " large herds.
- (g) " " " producers in different sections.

9. Cost of hauling and freight.

- (a) Country hauling by farmers.
- (b) Freight to Rochester; by truck or wagon; by trolley; by railroad.
- (c) Trucking in Rochester to milk plants.

10. Cost of distribution.

- (a) Report on dealers' cost accounts from books.
- (b) Labor costs obtained by inspectors of plants.
- (c) Plant charges obtained by inspectors.
- (d) Costs for large dealers.
- (e) Costs for small dealers.
- (f) Total cost for the city.

11. Appraisal of investment by Rochester milk dealers.

- (a) In land.
- (b) In buildings.
- (c) In machinery.
- (d) In delivery equipment.

12. Control of milk supply by Rochester Health Department.
 - (a) Reports of work performed by Department of Health for ten years.
 - (b) Rochester milk regulations.
 - (c) Milk regulations of other cities compared with regulations of Rochester.
 - (d) Tuberculosis.
13. Sanitary condition of Rochester milk supply.
 - (a) Report of sanitary inspection of dairy farms.
 - (b) " " " " milk dealers' city plants.
 - (c) " " " " milk stores.
 - (d) Report of bacterial tests on Rochester milk supply.
14. Pasteurization.
 - (a) The adoption of pasteurization in the United States and elsewhere.
 - (b) Attitude of authorities towards pasteurization.
 - (c) Necessity for pasteurization in Rochester.

ORGANIZATION OF THE WORKING FORCE

Committee on Public Safety of the Common Council.

Director of public hearings.

Director of the survey.

Supervisor of dairy farms inspection.

Four dairy farm inspectors.

Supervisor of inspection of city milk plants.

Four city milk inspectors.

Certified accountant on dealers' cost accounts.

Three assistant cost accountants.

Supervisor of house to house canvass.

One hundred and fifty volunteer workers on house to house canvass.

Supervisor of weighing and measuring school children.

Twelve public health nurses.

Bacteriologist.

Supervisor of statistical tabulations.

Two assistant statisticians.

One secretary and six stenographers and clerks.

III

STATISTICS OF THE ROCHESTER MILK SUPPLY

Information as to the number of persons engaged in the different branches of the milk industry of Rochester, the volume of business which is transacted daily, and other general facts regarding the business were obtained from a number of sources.

The list of milk dealers was obtained from the Department of Health, and also the number of dairy farms. From the dealers themselves figures were obtained as to the number of quarts of milk received daily, and the number of quarts sold through different channels of trade. The numbers of employees, horses and wagons, were obtained by personal inspection of the factories by inspectors in the employ of the survey. According to the records of the Health Department, there are 745 dairy farms supplying the City of Rochester. From the dealers' own statements as to the number of producers from whom they purchase milk, the inspectors obtained the figure 779. The information obtained from these sources is shown in Table No. 7.

TABLE NO. 7

STATISTICS OF ROCHESTER MILK SUPPLY

Total number of dealers	136	
Quarts received daily	82,075	
Total daily sales	77,579	
Daily sales—Bottled milk retail	57,305	Quarts
“ “ —Bottled milk wholesale	11,386	“
“ “ —Can milk wholesale	8,888	“
Milk received by motor truck	24,985	“
“ “ “ wagon	3,018	“
“ “ “ railroad	48,163	“
“ “ “ trolley	5,909	“
Number of proprietors	137	
Number of employees	299	
Number of wagons	207	
Number of automobiles	71	
Number of horses	228	
Number of dairy farmers	779	
Quarts of pasteurized milk	44,110	
Per cent. of pasteurized milk	57%	
Number of dealers handling 500 quarts or less	101	
Per cent. of supply handled by them	34.2%	
Number of dealers handling 500 to 1,000 quarts	23	
Per cent. of supply handled by them	19.2%	
Number of dealers handling 1,000 quarts or more	11	
Per cent. of supply handled by them	46.7%	
Number of pasteurizing plants	24	
Number of dealers producing own milk	16	

The dealers furnishing milk for Rochester may be divided into three groups, according to the quantity of milk sold by them; the first group containing dealers selling less than 500 quarts daily; the second group of

dealers selling from 501 to 1,000 quarts daily; and the third group of dealers selling over 1,000 quarts daily. The number of dealers in each group of those selling raw milk and pasteurized milk, and the quantity of raw and pasteurized milk sold by them is shown in Table No. 8.

TABLE No. 8
RAW MILK AND PASTEURIZED MILK

Group.	Number of Quarts Per Dealer Daily.	Number of Dealers.	Dealers in Raw Milk.	Dealers in Pasteurized Milk.	Total Sales of Quarts Daily.	Quarts of Raw Milk.	Quarts of Pasteurized Milk.	Per Cent of Total Supply.	Per Cent of Raw Milk.	Per Cent of Pasteurized Milk.
1	Less than 500...	102	96	6	27,416	25,600	1,816	35.3	76.6	4.1
2	500-1,000	23	12	11	15,175	6,745	8,430	19.6	20.2	19.1
3	Over 1,000	11	1	10	34,988	1,084	33,914	45.1	3.2	76.8
		136	109	27	77,579	33,429	44,160	100.0	100.0	100.0

In the above table, one of the dealers in group No. 1 sells both raw and pasteurized milk, and two of the dealers do not own pasteurizers, but hire their milk pasteurized by others, therefore, while there are 27 dealers selling pasteurized milk, there are only 25 pasteurizing machines in operation. It is noteworthy that out of 33,429 quarts of raw milk sold in the city, 25,600 quarts are sold by the dealers in group No. 1, who sell less than 500 quarts each daily. These 102 small dealers sell 76.6% of all the raw milk sold. Contrasted with this, the 11 dealers selling over 1,000 quarts each sell only 1,084 quarts of raw milk in all, or 3.2% of the raw milk sold.

On the other hand a study of the quantity of pasteurized milk sold daily shows that out of 44,160 quarts, the small dealers in group No. 1 sell only 1,816 quarts, or 4.1%, while the large dealers in group No. 3 sell 33,914 quarts of pasteurized milk, or 76.8%. The dealers in group No. 2 selling between 500 and 1,000 quarts are more evenly divided in their sales of raw and pasteurized milk, selling 6,745 quarts of raw milk, and 8,430 quarts of pasteurized milk daily.

FAMILY QUESTIONNAIRE AND HOUSE TO HOUSE CANVASS

As one means for determining the use of milk by milk consumers in the City of Rochester, arrangements were made for an inquiry by house to house visitation of a sufficient number of families to give a fair index of the uses of milk in the home.

Mrs. Helen Probst Abbott, President of the Women's City Club, kindly volunteered to organize the members of a large number of the women's organizations of the City of Rochester, with the object of securing the services of voluntary workers who would carry out the details of this inquiry. In accordance with this plan, the members of the following organizations were invited to meet at the University of Rochester:

Women's City Club
Industrial Nurses
Council Jewish Women
Sisterhood Berith Kodesh
Public Health Nurses' Association
Tuberculosis Society of Monroe County
Door of Hope
United Jewish Charities
Business Women's Club
Women's Union
Syracuse Alumni Association
Home Service—Red Cross
Social Workers' Club
W. C. T. U.
Temple Beth El Club
Lake Avenue Baptist Women's Society
Scottish Women's Club
Theosophical Society
Osteopathic Society
Nineteenth Ward Civic Club
J. Y. M. A. Auxiliary
Social Welfare League
Women's Alliance, Unitarian Chapter
College Women's Club
Principals' and Superintendents' Club
Sisterhood of Beth El

Two such meetings were held and as a result over 150 volunteer workers were organized. Dr. John H. Murlin, Professor of Vital Economics in the University of Rochester, kindly volunteered to act as supervisor of the investigation. He prepared a form of questionnaire which was printed for the use of the investigators and gave personal instructions to each investigator as to its use.

The geography of the City of Rochester and the distribution of its population was very carefully gone over and the city was divided into districts to which a sufficient number of investigators were assigned, to include in the investigation a proper representation of every part of the city and of every class of inhabitants.

The report blanks, as fast as they were completed, were delivered to the office of Dr. Murlin, and with the assistance of the office staff of the

Survey, a complete tabulation was made. The summary of the statistics compiled was as follows:

Number of families visited.....	1,330
Total number of persons in families.....	7,122
Children under 1 year.....	242 or 3.398%
" 1 to 6 years.....	1,614 or 22.662%
" 7 to 16 years.....	1,722 or 24.179%
Total number of children.....	3,578 or 50.239%
Adults over 16 years.....	3,544 or 49.751%

One of the most important questions in the inquiry was as to the total family income per week, and the total money spent for food and for milk. The following figures were obtained from this part of the inquiry:

INCOME PER WEEK (1,095 Families)

Family income (except from boarders and roomers).....	\$31,522.28
Income from boarders and roomers.....	1,414.25
Total income.....	\$32,936.53
Amount spent weekly for food, including milk (998 families)	\$14,486.76
Amount spent weekly for milk (1,330 families).....	1,801.71

The quantity of milk and dairy products used daily is shown in Table No. 9.

TABLE No. 9
MILK USED DAILY

Bottled milk (28 quarts donated).....	1,838 quarts
Loose milk	73 quarts

AMOUNTS AND COST OF OTHER DAIRY PRODUCTS USED WEEKLY

	Amount	Price	Cost
Buttermilk	140 quarts	\$.090	\$ 12.59
Skimmed milk.	524.5 quarts	.051	26.51
Condensed milk	1,197.75 cans	.149	178.10
*Cream	192 quarts	.614	116.61
Butter.	2,224 pounds	..	..
Number of families reporting butter.....			1,057
Number of families reporting oleo.....			59

*2 quarts donated.

MILK USED DAILY FOR DRINKING

By children	692 quarts
By adults	128 quarts
Unclassified	240 quarts
(Unclassified milk distributed by income groups added to milk used daily for drinking.)	
Total by children.....	882 quarts
Total by adults.....	178 quarts

FAMILIES USING NO MILK

Number of families.....	88
Number of adults	208

CHILDREN IN FAMILIES USING NO MILK

Number of children under 1 year.....	19
Number of children 1 to 6 years.....	110
Number of children 7 to 16 years.....	145

One question in the inquiry referred to the race to which the families belonged. In determining the race, American born parents were put down as Americans, while foreign born parents were put down as belonging to the race from which they came. The results of this question are shown in the following tabulation:

NUMBER OF FAMILIES—1330

American.....	691	Austro-Hungarian ...	10
Italian.....	243	French.....	8
German.....	100	Greek.....	1
Jewish.....	56	Swiss.....	2
Canadian.....	43	Belgian.....	1
Russian.....	45	Danish.....	3
Irish.....	33	Colored.....	2
English.....	26	Roumanian.....	3
Polish.....	25	Swedish.....	1
Holland.....	17	Assyrian.....	1
Scotch.....	10	Not reported.....	9

A study of the results of this inquiry presents a number of features worthy of special notice. The real object of the study was to ascertain whether the family income bore any relation to the amount of milk used and to the milk consumed by children. As a first step toward determining this, it is desirable to note the relation of the income to the number of persons in the family—especially to the number of children in the family. The figures in the tabulation accordingly were sorted with this object in view and the results are shown in Table No. 10.

TABLE No. 10
SUMMARY OF FAMILY QUESTIONNAIRE
RELATION OF INCOME TO NUMBER OF PERSONS

Income Per Week.	Number of Families.	Per Cent. of Total Families Reporting Inc.	Number of Persons Per Family.					Total Persons.
			Children.				Adults.	
			Under 1	1 to 6	7 to 16	Total.		
Under 20.....	174	15.9%	.25	1.46	1.51	3.22	2.18	5.41
20 to 24.....	237	21.6%	.24	1.49	1.44	3.17	2.32	5.50
25 to 29.....	236	21.6%	.18	1.42	1.47	3.07	2.52	5.59
30 to 39.....	218	19.9%	.17	1.19	1.49	2.85	2.92	5.77
40 to 49.....	144	13.1%	.18	.99	1.15	2.33	2.93	5.26
50 and over.....	86	7.9%	.14	.91	1.12	2.16	3.38	5.55
Income not given..	235		.11	.81	.78	1.70	2.84	4.54

A consideration of Table No. 10 shows that the families having incomes under \$20.00 per week contain the largest number of children and that as the income increases progressively, the number of children per family decreases progressively, so that while families with incomes under \$20.00 per week had an average of 3.22 children, that families with incomes of \$50.00 and over per week, had an average of only 2.16. The number of adults in these families was smallest in the families of small incomes and largest in the families of large incomes.

One factor which must not be overlooked in considering the meaning of these figures is that families with young children are, as a rule, families having young parents, and therefore smaller earning power. On the other hand, families of larger incomes are likely to be families having older parents and therefore older children increasing the number of adults. These circumstances would explain to some extent the meaning of these figures. There remains however, a most important fact in considering the necessity for furnishing a sufficient amount of milk for the nourishment of small children that the larger number of small children live in families having small incomes.

It appears that the incomes of some families must be expended to a large extent for food and the amount spent for milk must depend not only upon the size of the income, but on the intelligence with which the persons charged with the responsibility of buying the food decide what portion of the income should be spent for food and what portion should be spent for milk. An effort was made to learn whether families with large incomes buy a larger proportion of milk than they do of other foods. The figures have been tabulated in a manner that exhibits the facts respecting this information in Table No. 11.

TABLE No. 11
SUMMARY OF FAMILY QUESTIONNAIRE
RELATION OF INCOME TO FOOD EXPENSE AND MILK EXPENSE

Income Per Week.		Number of Families.	Amount Spent Weekly for Food.	Per Cent. of Total Income for Food.	Amount Spent Weekly for Milk.	Per Cent. of Total Income for Milk.	Per Cent. of Food Expense for Milk
Group.	Average						
Under 20	\$16.17	174	\$10.38	64.2%	\$.90	5.6%	8.7%
20 to 24	21.58	237	12.81	59.4%	1.12	5.2%	8.7%
25 to 29	26.48	236	14.43	54.5%	1.36	5.1%	9.4%
30 to 39	32.77	218	15.62	47.7%	1.46	4.5%	9.3%
40 to 49	47.18	144	15.59	33.0%	1.47	3.1%	9.4%
50 and over	56.08	86	19.97	35.6%	1.87	3.3%	9.4%
Income not given..		235	16.79		1.57		9.4%

Figures in Table No. 11 show that the families with smaller incomes spent a larger percentage of the income for food than the families with larger incomes, and that families with small incomes also spent a larger percentage of their incomes for milk than families with larger incomes. The percentage of the total food expense spent for milk does not show so great a difference. Families with incomes under \$20.00 seem to spend a slightly smaller amount of their food money for milk than families with incomes above \$20.00. The figures in the last column show this.

The relation of the quantity of milk to the number of children in a family is the most important item in this special inquiry. The total number of quarts used per day in each of the income groups and the quarts used by children, are given in Table No. 12.

TABLE No. 12
SUMMARY OF FAMILY QUESTIONNAIRE
RELATION OF INCOME TO AMOUNT OF MILK USED

Per Week. Income	Quarts of Milk Used Per Day.	Quarts of Milk Per Child Per Day for Drinking.	Quarts Per Capita.	Per Cent. of Families Using no Milk.	*Percentage of Required Amount of Milk Used.
Under 20	1.03	.19	.19	17.8%	31%
20 to 24	1.22	.20	.22	8.4%	28%
25 to 29	1.51	.24	.27	4.2%	48%
30 to 39	1.54	.26	.27	5.0%	50%
40 to 49	1.48	.24	.28	2.9%	54%
50 and over	1.87	.39	.34	2.4%	69%
Income not given	1.60	.32	.35	4.2%	71%

*The amount of milk required was calculated from the standard of the Association for Improving the Condition of the Poor, New York City. The standard is as follows:

Children under 6 years.....One quart
Children 6 to 16 years.....One-half quart
Adults One-third quart

NOTE: Of the 1,330 families, 88 or 6.6% used no milk.
These families include 5.9% of the total number of adults and 7.7% of the total number of children.

The most interesting feature of the figures in Table No. 12 is shown in column No. 3, where it appears that in families with incomes of less than \$20.00 per week, the children receive only .19 quarts of milk per day for drinking, while in families with larger incomes there is a progressive increase in the quantity of milk fed to children and in families having incomes of \$50.00 a week and more, the children receive .39 quarts of milk daily, or just twice the quantity of milk received by children in the families first mentioned. If we compare the amount of milk fed to

the children in the families of each of the income groups, with the amount of milk recommended for children by some of the leading food experts, we find that the children in group No. 1, or families with incomes under \$20.00, were receiving only 31% of their requirement. These percentages are shown in the last column of Table No. 12.

It appears also that there is a progressive increase in the percentage of milk received in each income group, until in families where the weekly income is \$50.00, or over, the children are receiving 69% of their milk requirements.

The conclusion which must be reached from these data is that in all of the families visited the children are receiving less than their milk requirements and that the income of the family has a most close relationship to the quantity of milk purchased and the quantity used by children. The children, especially in the families with small incomes, are not receiving the milk necessary for their growth and development.

One of the methods of testing the accuracy of the work performed in this inquiry, is to compare the amount of milk used by the entire list of families with the amount used by the City of Rochester during the same period at the time the inquiry was conducted as follows:

Total population of families visited.....	7,122
Estimated population of the City of Rochester.....	290,000
Percentage of total population in the families visited..	2.456%
Total amount of milk used by these families.....	1,911 Qts. Daily
The total milk sold daily in Rochester.....	77,580 Qts.
Percentage of the Rochester milk supply used by families visited	2.463%

Therefore the percentage of the total population visited in this inquiry corresponds very closely with the percentage of the total milk supply used.

These figures justify the belief that the families visited fairly represent the character of the population of Rochester, both in the different age groups and the quantity of milk which is used by them. On this assumption, using the figures obtained in this inquiry as a basis, the milk consumption of the entire City of Rochester for the entire population is presented in Table No. 14.

TABLE No. 13
FIGURES FROM 1330 FAMILIES

	Population.	For Drinking. Quarts.	Other Uses. Quarts.	Total Quarts.	Should Use. Quarts.
Children—1 to 16 years...	3,578	882	428	1,310	2,717
Adults—over 16 years.....	3,554	178	423	601	1,181
Total.....	7,112	1,060	851	1,911	3,898

TABLE No. 14
ESTIMATED AMOUNT OF MILK USED BY CHILDREN AND ADULTS
OF ROCHESTER COMPARED WITH QUANTITY RECOM-
MENDED BY FOOD AUTHORITIES

	Population.	For Drinking. Quarts.	Other Uses. Quarts.	Total Quarts.	Should Use. Quarts.
Children—1 to 16 years...	145,693	35,768	17,358	53,126	110,633
Adults—over 16 years.....	144,307	7,218	17,156	24,374	48,102
Total.....	290,000	42,986	34,514	77,500	158,735

The distribution of the families in the city districts visited was purposely arranged so as to give so far as possible a cross-section of the entire population of the City of Rochester. The fact that the population of the families visited gave almost the same percentage of the total population as the quantity of milk consumed to the total milk supply of the city is a substantial reason for believing that the families visited did represent fairly a cross-section of the city. On this basis the age distribution of the children and adults in the families visited if applied to the entire city would indicate that the population of the entire city of Rochester is divided as follows:

Children under 1 year.....	9,854
Children 1 to 6 years.....	65,720
Children 7 to 16 years.....	70,119
Adults over 16 years.....	144,307
Total Population.....	290,000

In the testimony of Professor McCollum, delivered at one of the hearings, it was stated that on the basis of his careful experiments as to the milk requirements of animals and of human beings, he believed that every person, young and old, should consume not less than one quart of milk a day, or its equivalent. This would mean that the population of Rochester of 290,000 should consume 290,000 quarts of milk daily.

If we use the figures which are accepted by the New York Association for Improving the Condition of the Poor as representing the milk requirements of children and adults, children under 6 years would use one quart each; children 6 to 16, one-half quart, and adults, one-third quart. If these amounts of milk are applied to the population of Rochester, as above indicated, it would make it necessary that the children from 1 to 16 years in Rochester should use not less than 110,633 quarts daily for drinking and other purposes, and the adults over 16 years should use not less than 48,102 quarts for drinking and other purposes. This would require a total milk supply of 158,735 quarts, as compared with 77,500 quarts which was being used at the time the house to house canvass was conducted. This means that both children and adults are now using less than one-half of the quantity of milk which is required for the promotion of growth, and the maintenance of health and strength.

IV

UNDER-NOURISHMENT IN SCHOOL CHILDREN

One of the most vital questions, if not the most vital question, connected with the problem of municipal milk supply, is the under-nourishment of children of school age and under school age. Wonderful discoveries made by the leading research workers in the chemistry of foods and nutrition, have shown that during the growing period of children, milk is a vital factor. In other parts of this report appears the testimony of Professor McCollum, emphatically showing that there is no substitute for milk for the growing child.

The highest legal authorities agree that any action on the part of municipalities to increase their legal powers for the control over municipal milk supplies, must be based, not on economics alone, but on evidence that the health of the people is being injured through the present system of milk supply and distribution. There would be no real reason for the present milk agitation in Rochester or any other cities, if it cannot be demonstrated that public health is being injured.

In the background of all movements and investigations connected with milk supply, is the idea that children are not receiving all of the milk which they require, and that some damage is being done to their health and welfare because of present conditions in the milk business.

It is for the above reason that no branch of the milk survey of the City of Rochester is of more importance than the inquiry into the relationship between the milk supply and the nourishment or under-nourishment of children. Recognizing this, the directors of the Survey early in the month of August undertook to make arrangements for a systematic examination of school children in Rochester. The program presented to the city authorities at that time was one which called for the determination of the weight and height of all school children and also the securing of information as to their diet, especially with reference to the quantity of milk consumed by them. These plans were presented and approved by the Mayor and the Chairman of the Committee on Public Safety, and the director of the Survey was ordered to proceed with the investigation. The co-operation of the Board of Education was necessary in order to carry out these investigations in the Public Schools. This co-operation was secured and plans perfected for carrying out this work, when information was received that the Bureau of Health intended to perform a similar investigation of its own. In order to avoid a duplication of effort therefore, and as a matter of courtesy to the Bureau of Health, the directors of the Survey sought the co-operation of the Bureau of Health in carrying out this work. The Health Officer, Doctor Goler, stated how-

ever, that he was equipped with a force of nurses sufficient only to secure information from 11 Public Schools. For this reason the director of the Survey asked the city authorities to furnish to the Health Bureau a sufficient force of nurses and other workers to carry out the weighing and measuring of school children in all of the 47 Public Schools in the city. The Commissioner of Public Safety consented to furnish such facilities and in accordance with this plan notified the Director of the Bureau of Health that such facilities would be furnished. This offer, however, was declined, and as a consequence, the Bureau of Health failed to carry out this work in more than the 11 schools above mentioned.

Information was secured through the Board of Education as to the milk consumed by the children in all of the 47 Public Schools of the city. The children were classified into two classes—milk drinkers and non-milk drinkers. The report blanks used included the following items:

School Number, Grade Number, Child Number, Age, Sex, Race, Height, Weight, Milk Consumed and Under-nourished. Through the Superintendent of Schools information concerning every school child was obtained on all of the above subjects, excepting height and weight.

In the expectation that complete reports would be received from the 47 schools, the complete tabulations of the results from the 11 schools where height and weight were also obtained, was not attempted. For the purpose of showing what results could be achieved were this work completed, there is presented below a statement of a portion of these tabulations which have been prepared.

In Table No. 15 is presented the statistics of the 11 schools in which the children were weighed and measured, showing how many children of each sex and race were in each school and the number of milk drinkers and non-milk drinkers.

TABLE No. 15
STATISTICS FROM ELEVEN PUBLIC SCHOOLS

Race.	Number Males.	Number Females.	Total.	Per Cent. of Total Children.	Number Drinking Milk.	Per Cent. Drinking Milk.
Anglo-Saxon	1,499	1,499	2,998	29.9%	1,843	60.5%
Jewish	894	819	1,713	17.1%	1,328	77.5%
Latin	2,040	1,990	4,030	40.2%	2,112	52.4%
Teutonic-Scandinavian.	348	310	658	6.6%	360	54.7%
Slavic	284	286	570	5.7%	350	61.4%
Other Races	23	33	56	.5%	40	71.4%
Totals.....	5,088	4,937	10,025	100.0%	6,033	60.2%

A detailed statement of the children of each age from 4 to 16 of the Anglo-Saxon race—males—drinking milk and non-drinking milk and their total height and weight and average height and weight is presented in Table No. 16.

TABLE No. 16
ANGLO-SAXON MALES

MILK DRINKERS						NON-MILK DRINKERS					
Age.	Number.	Total Weight.	Total Height.	Average Weight.	Average Height.	Age.	Number.	Total Weight.	Total Height.	Average Weight.	Average Height.
4	19	725	782	38.16	41.68	4	4	145	166	36.25	41.5
5	65	2,693	2,824	41.43	43.45	5	13	515	550	39.62	42.31
6	115	5,176	5,183	45.01	45.07	6	40	1,763	1,789	44.08	44.72
7	121	5,928	5,700	48.99	47.11	7	58	2,808	2,718	48.41	46.86
8	87	4,819	4,328	55.39	49.75	8	59	3,150	2,927	53.39	49.61
9	116	6,889	6,020	59.39	51.90	9	76	4,433	4,029	58.33	53.01
10	95	6,316	5,080	66.48	53.47	10	97	6,238	5,136	64.31	52.95
11	86	6,168	4,747	71.93	55.20	11	76	5,459	4,186	71.83	55.08
12	60	4,692	3,430	78.2	57.17	12	69	5,414	3,973	78.46	57.58
13	53	4,586	3,138	86.53	59.21	13	48	4,117	2,835	85.77	59.06
14	39	3,897	2,425	99.92	62.18	14	25	2,267	1,505	90.68	60.2
15	19	1,965	1,200	103.42	63.16	15	2	1,470	886	105.	63.29
16	..	..	..	..	..	16	14	213	127	106.5	63.5

In the above tabulation it is obvious that the children drinking milk weigh more than the children who do not drink milk. Taking each age independently and inspecting the column of "Average Weight" shows for example, that children 4 years' old average 38.16 pounds, while the children of the same age not drinking milk, average 36.25 pounds. Following down these columns item by item, shows that with the exception of the children 12 and 15 years of age, the children of all other ages who drink milk weigh heavier than the children who drink no milk.

These figures are sufficient to suggest a relationship between the quantity of milk consumed and the physical condition of the children. The relationship between physical condition and mental condition is so well recognized, that it is unnecessary to state that the child who is healthy and strong is also more vigorous mentally.

If a sufficient number of statistics could be compiled, it is believed that the relationship between milk drinking and a healthy condition of the child would be even more striking than this. The figures in the above tabulation, however, are sufficiently striking to show that this method of inquiry deserves much greater attention than it has received and that great benefits could be expected not only for the public school children of Rochester, but for the public school children of other cities, if these children could be regularly weighed and measured and information secured as to their daily diet, especially with respect to milk drinking.

As an example of the extent to which some cities have gone in this matter, it is interesting to note the action taken by the city of Seattle, Washington, under the able direction of Doctor Ira C. Brown, Medical Inspector of the Seattle Public Schools. Last year 97,000 examinations

of school children were made by the public health nurses working under his direction. In the report published by Dr. Brown, entitled "The Seattle Way of Caring for School Children," he states:

"My experience teaches me that unless a child get a good supply of milk until at least fifteen years of age, it will not develop properly. There may be no surface indications of weakness. But its system will lack that vitality that only Nature's Food, Milk, can give and it will readily fall a prey to diseases that a milk fed child will resist easily. I am speaking not only from my experience of many years in this school work but also as a father and now as a grandfather.

"The city is organized in districts, a school nurse is in charge of each district. The size of the district and the number of children under the supervision of one nurse, is carefully arranged so that each and every one may receive the requisite attention."

Dr. Brown says further:

"When a child just starting to school has his first examination a card is made out for it. Its physical characteristics are tabulated. If any operations or any forms of medical treatment are seen to be necessary a notation to this effect is made and notations are also made as to the carrying out of the operations or treatment that has been specified."

"It was particularly noticed that many of the children received little or no milk. The parents were advised by the nurses to give each of their growing children a pint a day as the least amount sufficient for healthy development. Many of them could not, or imagined that they could not, afford it."

"So Dr. Brown outlined to the School Board the proposal of supplying milk at school to those children who were known to need it. The Board was sympathetic, but Dr. Brown's proposal was a voyage on an unknown sea. 'What is going to be the cost? Where are we going to arrive?' they asked."

"I don't know," replied Dr. Brown, "but I am sure it will be some good place!"

So they gave him authority to spend up to \$500 per month. Shortly after they removed all restrictions and told him to "go the limit." He has been "going the limit" ever since and the sequel is to follow.

He obtains on contract a supply of high-grade pasteurized milk put up in half-pint bottles. All children, well-to-do and poor alike, obtain it at school on the presentation of milk checks. The well-to-do buy their checks. The children of the poor are supplied by the nurse in charge of the district, who is familiar with the conditions in each home. Thus no child is shown to be an object of charity and exposed to possible ridicule by other more fortunate children.

The business end of the daily supply is handled by committees of the children themselves. The room committee takes the order of each child in the room for the following day. It then phones the order for the total amount required, to the Central Office.

Should a child who has ordered milk fail to take it as arranged, through having changed his mind and spent his money for candy or gum, or something else that appealed to him, they let him understand that an order is an order and that he is required to pay the following day. In this way the child receives valuable training in the importance of doing as he agrees to do.

The Children's Committee sells the checks to those who buy milk. They check up the amount of cash received against the number of milk checks sold; also the number of milk checks received against the number of bottles issued. They put up the cash for deposit with the bank. They make out the deposit slip. This is part of their arithmetic and business training.

"Within the first six months of supplying milk to the children at school," says Dr. Brown, "the teachers found that their efficiency in the school work had increased two and a half per cent. Restlessness and fidgeting seemed to disappear. Their power to give attention was increased. The plan has now been in operation for nearly four years. At the end of the fourth year, we intend to tabulate and publish the results. Covering such a period of time they will be conclusive.

"It is not merely the children of the poor who have benefited. It is a well known fact that children of families in comfortable circumstances receive far less milk than their growing bodies need. When we began supplying the poor children, the parents of the others awoke to the desirability of their offspring having milk at school. It was to meet this demand that we began selling the milk checks to those who could afford to pay.

"From this starting point public interest in milk has been awakened. Not only in the schools but also in the homes has the per capita use of milk been increased. I question if any other city in the country is consuming as much milk per capita as Seattle."

V

MILK SUPPLY OF PUBLIC INSTITUTIONS IN ROCHESTER

It is important to examine into the character, quality and quantity of milk used by public institutions. In such institutions, especially hospitals and asylums for children, milk is a most important article of diet, and experience has shown that for financial reasons there is in most municipalities a tendency to economize on the milk supply of institutions, with the result that very often the quantity of milk purchased is far too little for the needs of the inmates, and the quality is often so inferior that it is a menace to their health.

The replies to the questionnaires sent out by the office of the Survey to Rochester public institutions are summarized in Table No. 17.

TABLE No. 17

Total number of institutions.....	26
Children under 16 years of age.....	975
Adults	4,612
Total inmates	5,587
Money daily spent for milk.....	\$ 372.27
Money daily spent for groceries.....	1,760.62
Total expenditure for food	2,129.85
Daily quarts of bottle milk used.....	350
“ “ “ loose milk in cans used.....	3,271
“ “ “ buttermilk used	21.5
“ “ “ skim milk used	33
“ cans of condensed milk used.....	35
“ quarts of cream used.....	39.5
“ pounds of butter used	350.7
“ quarts of ice cream used.....	11
Quarts of milk used daily for cooking.....	721
Quarts of milk used daily by children on cereals and for drinking	661.66
Quarts of milk used daily by adults on cereals and for drinking.	2,238.33
Number of quarts of raw milk.....	2,884
Number of quarts of pasteurized milk.....	737

From the above information it is evident that 975 children consume daily 661 $\frac{2}{3}$ quarts of milk on cereals and for drinking purposes, while 4,612 adults consume 2,238 $\frac{1}{3}$ quarts in the same way. No serious criticism can be made against the quantity of milk furnished to either the children or the adults, although the highest authorities now recommend that every child should have available for drinking purposes at least a quart of milk daily, or its equivalent.

In Table No. 17, the money spent for milk does not include one institution having its own cows, and the money spent for groceries does not include two institutions which did not report such expenditures.

The daily per capita consumption of milk in these institutions has been determined by dividing the quantity consumed by children by the number of children; the quantity consumed by adults by the number of adults, for each institution in the different groups. These figures are arranged according to the institutions in the different groups and presented in Table No. 18.

TABLE No. 18
DAILY PER CAPITA CONSUMPTION OF MILK IN ROCHESTER INSTITUTIONS

<i>Name of Institution.</i>	<i>By Children.</i>	<i>By Adults.</i>	<i>Average.</i>
ORPHAN ASYLUMS			
Rochester Orphan Asylum.....	.81 qts.	.50 qts.	.87 qts.
Jewish Orphan Asylum	.48	.27	.63
St. Mary's Orphan Boys' Asylum.....	.61	..	.49
Jewish Sheltering Home	.30	..	.44
St. Joseph's Orphan Asylum.....	.35	.50	.42
St. Patrick's Orphan Girls' Asylum.....	.48	.10	.53
Dorsey	.72	.20	1.00
P. E. Church Home.....	.76	.11	.47
HOSPITALS			
Hahnemann	..	.49	.60
Rochester General	..	.53	.74
Homeopathic.	.93	.51	.62
Municipal	1.50	.63	1.15
Monroe County Tuberculosis Sanitarium.....	1.49	.99	1.21
Rochester State	..	.39	.50
Infants' Summer	.97	.56	.88
Monroe County	1.00	.32	.41
St. Mary's	2.00	2.10	2.40
Park Avenue	..	.33	.64
INSTITUTION, INDUSTRIAL			
Salvation Army.	..	..	..
PENAL INSTITUTIONS			
Monroe County Jail	..	.45	.45
Monroe County Penitentiary	..	.24	.47
Monroe County Almshouse	..	.18	.37
HOMES AND OTHERS			
St. John's (German) Home for Aged.....	..	.13	.26
German Students' Home	..	.75	.88
Rochester Girls' Home	.21	.33	.50
St. Elizabeth's Girls' Home	1.50	.16	.30
St. Ann's Home for Aged.....	..	.44	.50
Rochester Friendly Home	..	.30	.60

In the above table it is noteworthy that among the orphan asylums two of them are providing milk for children at the rate of .30 and .35 quarts per child, while one institution provides .48 quarts per child. When this is compared with the recommendations made by Professor McCollum and other authorities that each child should have at least one quart of milk a day, it is obvious that these children are receiving much less milk than is required for their health. When this is compared with

the quantity of milk fed to children in the Infants' Summer Home, which is approximately one quart daily, and the quantity furnished to children in the hospitals, it is clear that the orphan asylums are not feeding to their children nearly sufficient quantities of milk. An examination of the milk fed to adults shows that in the three homes for the aged, these old people are receiving .13, .30, and .44 quarts of milk daily. Food experts now recognize that old people should be supplied with an abundance of milk, as milk is far more suited to their digestion than other forms of food. The quantity of milk supplied in these homes for the aged is less than is necessary to maintain the health and strength of these people.

In another manner the milk supply of these institutions has been tabulated by summarizing the child population, and the quarts of milk used by children, and the adult population and the quarts of milk used by adults. These summaries are prepared for the purpose of showing how the character of the group of institutions is related to the quantity of milk used.

TABLE No. 19

Institution.	Child Population.	Daily Quarts Milk Used by Children.	Children's Per Capita Consumption.	Adult Population.	Daily Quarts Milk Used by Adults.	Adult Per Capita Consumption.
Orphan Asylums (8)	763	443	.5806	202	42	.2079
Hospitals (5)	123	132	1.0731	1,086	685	.6307
Old People's Homes (3) ...	..	..	..	349	118	.3381
Infants' Summer Home (1)	62	60	.9677	50	28	.5600
Penal and other institutions	27	27	1.00	2,925	1,365	.4666
	975	662		4,612	2,238	

From Table No. 19 it appears that the per capita consumption of milk for children in orphan asylums is by far the lowest of the consumption of children in any other institutions. Under a proper system of feeding, one would expect that the milk consumed by children in orphan asylums would be in excess of the quantity of milk consumed in other institutions, or at least its equivalent. On the other hand, in old people's homes the per capita consumption for adults is lower than the consumption for adults in either hospitals or penal institutions.

In the matter of the sanitation of their milk supply, these institutions are open to serious criticism. There are only 737 quarts of milk pasteurized while 2,884 quarts are raw milk. Nineteen institutions out of twenty-six have their supply strictly limited to raw milk. This means that these institutions are constantly exposed to the sudden onset among

their inmates of an epidemic of infectious diseases, due to milk infected by dairy animals or dairy employees. The record of such institutional epidemics is a long one, and it has only been a matter of good fortune that the institutions which are supplied with this raw milk have escaped. The pasteurization of an institutional milk supply is now recognized as necessary to safeguard the inmates from epidemics of infectious diseases.

VI

THE FOOD VALUE OF MILK

There is no better way of presenting this subject than to quote extracts from the testimony of Dr. E. V. McCollum who appeared as a witness on behalf of the Committee at a public hearing held in the City Hall, Rochester, September 18, 1919.

Dr. McCollum is recognized as one of the leading food chemists of America, and the chief exponent of the food value of milk. He has had a most unusual training and experience in studies in the chemistry of nutrition in Yale University, University of Wisconsin, and in Johns Hopkins University. At the present time he occupies the position of Professor of Chemical Hygiene in Johns Hopkins University. His testimony in part was as follows:

"At the time I left Wisconsin we had conducted approximately two thousand feeding experiments, every one planned with a theory underlying, and every one planned with an attempt to contributing to an answer regarding a long series of questions of a technical nature on nutrition. Those experiments in no case were under perhaps six weeks in length; a considerable number of them at least four years in length; and this work involved the use of all the different types of animals that are available on an experiment station farm, together with such small animals as are usable for laboratory study. Since going to Baltimore we have completed approximately fifteen hundred further experiments with animals, each one contributing to an interpretation of the technical problems which we have in view.

"The first observation that we ever made that was of great importance in perfecting our views regarding the whole subject of nutrition was made in 1912. It consisted of a demonstration that it was possible to make a certain diet which could be fed to a group of animals and would lead to a failure of nutrition; that the same diet fed with such vegetable fats as olive oil or cotton seed oil or lard or tallow or almond oil, would still lead to prompt failure and always with one type of error in nutrition, or rather pathological state. That pathological condition relates to the eyes. This particular type of diet fed with any of the vegetable fats or body fats of animals would lead to swelling of the tissues around the eyes and inflammation of the eyeball, and total blindness, and ultimate death. We produced blind rats, blind pigs, blind cows, blind pigeons, and there is no question but what it applied to numerous species of animals. But curiously enough this same diet which was so serious when fed with vegetable fats, became nutritious for an animal when we introduced certain other fats instead of the vegetable fats or body fats of animals; when we put butter fat or egg yolk fat into this diet and made no other change, no

change in the methods of handling animals, we never saw this eye trouble develop. We found even after the eyes could no longer be opened, we could change the diet in connection with butter fats and with vegetable fats, and if the animals were not too far gone, the introduction of milk fats or egg yolk fats into the diet would cause a progressive reaction and recovery, and frequently a complete recovery. It is possible even after the eyes are so far deteriorated as to cause permanent blindness to cure this condition by introducing butter fat or egg yolk fat into the diet. This observation that I mention was first published in 1913, in June; and in 1913, in November, Dr. Osborne and Dr. Mendel of Yale published essentially the same type of diet, extending the work somewhat by saying cod liver oil would relieve his pathological state in just the same way that butter fat or egg yolk fat did.

"There are three types of diets which have succeeded both for animals and for men. The first of these is the type of diet which is entirely derived from animal tissues. This is used by such animals as the lion, the tiger; and such men as the Eskimo or the carnivorous Indian of the plains east of the Rocky Mountains in the days when the buffalo furnished his sole food supply. Now, that does not mean that simply meat eating is satisfactory. The Eskimo succeeds in living a fairly long period; they rarely reach a great age; never live a great age in terms of great age of ours. He rarely lives 60 years, and he is an inefficient individual. He succeeds, as we know from animal experimentation, because of prodigal habits in the choice of food. The Eskimo, I know from the testimony of a number of people, selects as the most appetizing portion of the animal that he may kill for food, the blood. If he kills a reindeer, he consumes his blood first of all. The American Indian on the Western plains did the same thing, killing buffalo; they liked warm, fresh blood. The lion and tiger do the same thing. The second choice of food in the carnivorous animal is always one of the organs, such as the liver or the kidney or its nervous tissue. They will open the brain cavity or body cavity and eat those organs second after the blood. The third choice of the carnivorous animal is the bone marrow or soft ends of the bone, the same as man. The last choice of the carnivorous animal is the muscle tissue. That is the one which we in temperate regions living on both an animal and vegetable diet, select as the most appetizing cuts of meat, such as round steak, porterhouse steak, and roasts, and we do not like the highly flavored glandular organs like the kidney stew every day or the liver and bacon. This is a type of diet which succeeds in a measure. Carnivorous man like the carnivorous animal, is lethargic after eating. He disturbs himself only when he is hungry. Dr. Grenfall in his book on Labrador says, the Whites will catch ten fish to the Eskimo's one.

The carnivorous animal when fed on this diet is indifferent and relatively harmless unless put on the defensive. The same is true of the carnivorous man. That is not a type of diet which succeeds from a standpoint of success as we regard it in civilized communities.

"Now, there is a second type of diet which succeeds with animals and with men up to a certain point. I refer to a type of diet common in parts of India, in Southern China and Japan, the Philippine Islands and in tropical countries generally; that is, the diet derived from vegetable products and meat. These people eat the cereal grains, beans and other seeds, and to some extent peas. They eat tubers, more or less fruit, and they eat meat, either fish or animal flesh, and they eat extraordinarily liberally of the leafy portion of plants. Now, animal experimentation in our laboratory first revealed the fact that this diet, cereals, tubers, roots, together with muscle tissue of animals, the type that the carnivorous creature and human being selects as his meat; this type of diet fails, but when supplemented with leafy food it succeeds up to a certain point with animals that can make a steady diet of cereals, tubers, roots and muscle tissue. But we cannot get success if he leaves out leaves.

"The leaf is so constituted with respect to quality of its proteins and mineral content and this substance which differentiates cod liver oil from vegetable fats, that the leaf supplements the tuber and edible root and muscle tissue of animals. But those people, the people, for example, from Southern China, the Chinese who run laundries in this country, I think you will all agree with me that they are in general a small people; very spare and rather small. They are inclined to be somewhat anaemic, yet fairly normal individuals as Chinamen would ordinarily go. It is a common practice, however, throughout China, according to information I have gained from a number of sources, for the Chinese men to want to retire from active business at fifty years, and they do, when it is possible. They quit work at fifty years and sit and smoke the rest of their days, the son or sons supporting the father. Now, that type of people, the natives of the tropics and of the Orient, while they exercise a certain amount of ingenuity in certain lines, they claim to have first invented gun powder, and have invented puzzles and games that have come down to our time—but they have not contributed, so far as I have been able to learn, to any new invention, or attained any standard in mental activities as have other peoples. Of course, we must accept this judgment on them with a certain amount of appreciation of the relation of other factors of progress that they bear; the type of religion that people adopt will determine in a great measure certain habits of life and thought, and that probably their food habits have something to do with their lack of enterprise and aggressiveness, and their high infant mortality. These are

related to the type of diet in some degree because the fundamental basis of enterprise, aggressiveness, achievement, is physiological well being. I will not dilate any further on that subject because part of it would be conclusions which we would necessarily base on very skimpy evidence. We must make a very thorough study of this problem before we draw positive conclusions on this.

"Now, there is a third type of diet which succeeds with animals and men; that is, the diet which is derived from cereals, from tubers, edible roots, meat, more or less leaves and more or less dairy products, and that is the best type of diet we know of. When we maintain one series of groups of experimental animals on carnivorous diet, and another series in which a leaf enters partly as diet; another diet in which milk and its products enter freely; and diets which are comparable in every respect, but which contain none of those three things; by observing those animals throughout their span of life, we find the diets are faulty when they fail to contain either leaf or milk, unless strongly of carnivorous origin.

"When we observe our animals throughout their span of life, we find that faulty diets lead to a failure to grow and reach adult size; to failure in reproduction, to high mortality and early death. By introducing such foods as leaves and milk, (foods which I came to designate about a year and a half ago, talking to the American Economic Association at Atlantic City, as corrective foods, because they correct whatever else we are liable to eat because they consist of the essentials), whenever we introduce an abundance of milk or leaf, we cure or correct the diet of these animals; prolong their life; increase their size and their capacity for reproduction; reduce their infant mortality; and prolong the period of vigor and maintenance of youthful characteristics. All these things correlate well with our study of human experience.

"May I say at this point that there are three substances which we have not yet discovered, the chemical nature of which we do not know, which are occasionally absent from the diet of men to an extent that leads to the production of three deficiency diseases. Most important of these is a disease known as beri-beri. It is common among Orientals—in China, India, in the Philippines; very common on the East Coast of South America, and parts of Brazil. They have it now in Labrador and Newfoundland. It is a deficiency disease due to a lack of a practically unknown substance which is lacking from certain diets. The chief characteristic of this condition is a general paralysis. The people in Labrador live essentially on a white bread diet and fish, and very little else—a certain amount of meat perhaps. The people of Newfoundland live on a diet of bread and fish and salt meat and a little raisin duff, month after month. They develop this condition of paralysis and go to the hospital

to be fed up on lime, and pretty soon are out in apparently a normal condition because they go to the hospital in the early stages of the disease. This condition has taken a toll of tens of thousands of lives throughout China, the Philippines, and several tropical parts of the world, and a few other places.

"The eye disease which I first described as being due to a lack of something such as butter fat supplies, I know of at least fifteen hundred cases of it, chiefly among children who use a cereal diet too largely and have developed this swelling of the tissues around the eyes. Many went blind; others were cured through the very keen observation of a physician named Morey who had the acuteness of observation to discover that if he gave these children a sufficient amount of chicken livers, their eyes would get well. I have already mentioned the fact that the fats from the inside of the cells of liver or of the kidney of an animal contain this unknown something which butter fat supplies. Over in Denmark a physician named Spuck, near Copenhagen, reported he met with about sixty children in the rural districts who had this eye trouble. He said that these were the children of milk producers; that there being such a good market for butter and cream they passed the milk through a centrifugal separator and sold the cream, and fed the babies on skim milk and before long they developed this eye trouble. He supposed that this was a fat deficiency disorder. We now know he was wrong in one respect; that you could give a child all the skim milk and the olive oil and cotton seed oil or vegetable oils that you could get, but you would not relieve that eye trouble, but if you give him whole milk, (and he did do that), the eyes come right back to normal.

"Apparently this disease is fairly common in various parts of Egypt and Southern China. I rely in making this statement on the opinion of Dr. Heiser of the International Health Bureau, who expressed this view after examining some animals in New York. This disease had been produced experimentally in my laboratory; he thought it was the same thing he had seen many times in Egypt and Southern China.

"I was very much interested about two weeks ago to receive a letter from a physician who was in Atlantic City, stating that very recently near Warsaw in Poland, his attention had been attracted by about thirty children sitting on a little hummock and whose movements were peculiar, and led to the arresting of his attention. He went over and examined them and discovered through his examination and information obtained from others, that these children were either blind or nearly blind, and they regarded it there as starvation blindness, which is apparently another instance. He said, 'This is fairly widespread in certain parts of Poland.' There are other instances of the occurrence in this country of this particular deficiency disease.

"And there is another type of deficiency disease, i. e., scurvy; a disease long known among sailors, among British soldiers in Mesopotamia, and it has occurred among men fed on certain food where the diet consists week after week of essentially non-perishable foods like white flour, rolled oats, rice, peas, beans and potatoes, a certain amount of meat, and foods cooked before they are fed. A patient feels chilly and the teeth become more or less loose; the flesh of the body loses its peculiar properties and you can punch a great hole in the thigh with your finger and the depression does not disappear promptly; the individual suffers considerable pain. I will not attempt to detail a description of the disease; but it is a very serious disease; it is occurring now more or less frequently among individuals.

"Those are the deficiency diseases. I mention these things to impress upon you the fact that as we examine human problems in nutrition in the light of a great deal of exact data obtained by a very careful plan of nutritive experiments on animals, we find that groups of human beings in various parts of the world are actually failing in nutrition from one cause or another, and we know now specifically the nature of the deficiencies in their diet and specifically the results of those errors in their nutrition.

"There seems to be a close relationship between the general health of fairly large groups of people and minor errors in the diet. We do not have to have a diet so deficient as to lead to prompt failure, or to lead to a development of a specific deficiency disease which brings the individual into the hospital, or he dies, or attracts the attention of his friends to the point where he receives medical attention. We do not have to restrict our interpretation of faulty diet to faults of these magnitudes; we are in a position, I feel confident to say definitely, that there are large groups of people who are deriving their diet largely from meat of a muscle tissue, a type of wheat flour in the form of bread and other articles, from potatoes, and from other cereals, such as rolled oats, rice, together with beans and peas; there are many people who make at least 90 or 95% of their table diet from cereals, tubers, and edible roots and meat. Such diet in our experience with animals is never satisfactory. Such a diet derived from cereals, tubers, roots and meat may lead to growth over a considerable period, but our experimental animals always fail to reach a full adult size when they stop growing. Their capacity for reproduction may be fairly good, but the mortality of their young is always high; and the adults themselves instead of living the full normal span of life which the species is capable of, show signs of old age early and have the specific signs characteristic of senility, poor condition, feebleness, nervousness, and irritability, and a gradual decrease in body.

Those are the characteristics of animals in the second half of life, or even much earlier, where they are fed on diets affording wide variety and which might fill the need of a dozen years ago, but not properly dieted.

"We find on examining the diets of mankind that there are large groups of specially employed people in cities who are purchasing almost all of their food supply from a grocery store or meat market; and our system of food distribution has led to the development of certain lines of food products which can be handled with little hazard by the grocer. Those are the cereal products; wheat flour, rolled oats, rice, corn products; various kinds of canned goods; tubers such as potatoes, sweet potatoes, and meat. These things are the staple articles of diet. That class of foods in no combinations has ever succeeded with experimental animals beyond simply bringing them up to partial completion of growth, and faulty performance of the functions of adult life; low reproductive ability; high infant mortality.

"This same kind of diet supplemented with an abundance of green vegetables makes a diet sufficiently complete to make the type of human beings we see among the Chinese, the Japanese, and the Philippines. Dr. Heiser told me that in his experience a full grown, middle aged Philippino who had grown up on a Philippino diet, a diet of meat, vegetables, cereals, grain and fish, would, when he went into the Government employ and was fed up according to European standards, the average adult Philippino would gain about 30 pounds in weight. These are undersized people, not because they do not have enough to eat, but because it is not properly selected. Their diet is capable of bringing up to adult life, but not capable of promoting physiological well being to the extent which is reached in the United States.

"We find on examination of the situation through visiting nurses and city health authorities, certainly in Baltimore, that large groups of employed people who derive so large a portion of their diet from meat, cereals and tubers, are the ones who furnish the very high mortality every year from tuberculosis. Here again human observation correlates very nicely with the observation on animals. When we feed animals on a faulty diet, we find they may come up for a time and look fairly vigorous and normal up to the point where they cease to grow, a little undersized; they fail at an early date; by the time they reach the age of half way through what the species is capable of, they will begin to go down hill; they do not simply die of malnutrition, but at a certain point in lowered vitality they are susceptible to infection of one kind or another; some die of tuberculosis and some of pneumonia; some infectious disease usually takes them off. That is what happens in the course of famine conditions in the world. In the first place, when the population passes

from a condition of well being and abundant food supply, passes towards famine conditions, the milk supply fails; the supply of green vegetables soon fails because the population is restricted more and more to those things that can be preserved over long periods. In cities, the diet of milk and vegetables runs down more or less rapidly and later there is an actual shortage of food. At a certain point in the lowered vitality of the community, people do not die of starvation, but an epidemic of one form or another arises and takes off hundreds of thousands or tens of thousands, according to the extent of the famine.

“Q. In the experimental work you are doing in Baltimore at the present time you are using rats?

A. We use rats almost altogether; we use more or less guinea pigs, and we have had farm pigs and cats, and recently prairie dogs for special experiment.

Q. About how many of these animals are you feeding at the present time?

A. We have about 1,500 at the present time.

Q. Do you mean to say that if these animals are fed from their infancy on such things as beef steak, potatoes and bread that they will not grow?

A. They will grow for a time but they will never reach the full adult size; will always be somewhat stunted, and their inferiority we judge by their low reproductive capacity, in the high infant mortality and in the short span of life or early appearance of signs of old age.

Q. When you say that if you add green leaves to their diet it seems to improve their condition, what kind of green leaves do you mean?

A. We have experimented with such leaves, especially with such leaves as are of interest from the standpoint of human nutrition. The list of leaves that we work with includes spinach, cabbage, cauliflower, brussels sprouts, turnip tops, beet tops, etc. We also work very considerably with alfalfa leaves and clover leaves.

Q. If they could eat a sufficient quantity of green leaves do you think that would put them in proper condition?

A. Yes, they would succeed in nutrition as does the cow, the horse, the sheep or goat; but the digestive tract of the rat is not sufficiently capacious to enable him to eat of this bulky type of food. Green leaves in sufficient amount would entirely correct the faults which will otherwise exist in this type of diet.

Q. Is the human digestive tract so arranged that they can eat a sufficient quantity of green leaves to keep them in good condition?

A. Yes, up to the standard which we observe in certain Orientals and tropical people; they fall short in general in the span of life, and in

figure, and capacity to rear their young, as compared with Europeans and Americans, except that we use much less of the leafy foods and much more dairy products.

Q. Your belief then is that the dairy products contain this vital substance to promote growth to a larger extent than the green leaves?

A. Our conclusions are that the use of milk as a food to correct the short comings of all other things that are commonly used as food is a matter of the greatest importance to our welfare and that is a factor of great importance in determining the standard of public health. The cow consumes relatively enormous amounts of leafy foods in the form of hays and silage and the rest of her diet is a grain diet of by-products in the milling industry; the peculiar qualities of her milk are due to the fact that she herself absorbs so much of the products derived from the leafy portion of her food.

Q. You feel that the cow's digestive organs are so arranged that she can consume a sufficient quantity of these green leaves to keep herself in a normally healthy condition?

A. There is no question about that.

Q. What do you call these substances?

A. I have tabulated in my note-books about twenty-five different names that have been given to these three different substances. The first name that appeared and the one which is still most popular, is the term 'Vitamine.'

Q. How do you spell that?

A. V-i-t-a-m-i-n-e-s. They have been termed 'Accessory Food Substances.' I gave two of them a name, designation letters of the alphabet, differentiated on the basis of their solubility; one, 'Fat Soluble A,' and two, 'Water Soluble B.' Now, at that time that was all there were. Later on it became necessary to modify that to designate one that protects against scurvy that is recently denominated as 'Water Soluble C.'

Q. Which one of these promotes growth in the individual?

A. He must have all three of them present in order for growth and health to be maintained.

Q. Now, is it your idea from these experiments that human beings will do better if they consume the correct amount of butter fat and of milk than they will if they try to maintain their lives on green leaves?

A. I have been forced to the conclusion that milk is a better food for the correction of the faults in cereal and meat diet than are the leaves, largely because of the concentrated character of the food.

Q. You think that the civilized nations of the world then owe their development to the use of dairy products?

A. I am inclined to hold that belief; one cannot establish at the present time such a view, but there is considerable evidence that that is the case. I can give you a few examples perhaps which will illustrate why I believe that. About the tenth to the twelfth and thirteenth centuries there was a great invasion of Europe as far as the Danube and of China by the Mongol hordes of Central Asia. Now, the Chinese are a people who do not or did not use dairy products; they used as their sole protective food, as their principal protective food, leaves to cure the deficiencies of their diet; they had used eggs in considerable amount, but they did not use dairy products. I have mentioned the fact that these people have not progressed in science, literature and art to the extent that certain other people have, but they have furthermore been overrun by hordes from the North and Northwest, rapidly succeeding invasions from the North and West throughout the period of history, and the people who have overrun China so many times are the Mongol hordes of Central Asia who are keepers of flocks and herds and whose principal article of diet is sour milk. They have overrun and been a thorn in the side of Russia up to within the last five or six hundred years; they overran the country as far West as the Danube in the thirteenth and fourteenth centuries.

The ancestors of the Turks were successful in war, extending their conquest westward, and lived on a diet of fruit and sour milk. The Arab living in a hot climate, in a climate whose daily temperature at noon frequently rises far beyond 100 degrees, lives largely on sour milk. They have camels' and goats' milk to some extent and to some extent cows' milk. Those people live largely on sour milk and on such a diet they not only live in the Torrid Zone, but they have energy, endurance and courage to traverse the weary caravan trails of the desert under a burning sun. The people of Europe and America have been great users of dairy products, and they and the very few other people in places where new countries have been settled by descendants of Europeans have reached the highest stage of civilization; have cultivated the best system of religion that we know of; have advanced furthest in scientific attainments, in literature and art and music and all lines of achievement of the human intellect. I believe these statements can scarcely be successfully controverted, and if there is anything wrong with them, I have been unable to learn it.

Q. Well, do you believe that after an adult has attained full growth that it makes any difference from that time on whether the diet includes dairy products or not?

A. It certainly does in the case of all types of experimental animals of the omnivorous type with a limited capacity of digestive tract with which to work.

Q. What do you find happens to them after they have attained their full growth if deprived of dairy products?

A. What happens to the animal is the early onset of old age. There are certain diseases which are commonly grouped together as old age diseases; those are, hardening of the arteries, or arterial sclerosis; defects of the heart; kidney degeneration; and the development of cancers or tumors. These four types of pathological conditions are characteristic and have been right along, of people advanced in life. Cancer occasionally occurs in a weak person, and tumors, but almost always in persons who are past middle life; the same is true of Bright's disease and diabetes. As a rule, but by no means always, they are characteristic, they occur in persons who are somewhat advanced in years, middle life or after. Hardening of the arteries, heart defects, are characteristic of old age.

Data accumulated by various insurance companies show that while say, 60 years was the age at which there was the greatest number of instances of these old age diseases, thirty years ago, they have been invading the earlier years of life with each succeeding decade, so that now many people of forty are developing typical old age conditions where formerly they developed them much later in life.

We are all familiar with the fact, we see every day people on the street who are actually only 30 or 40 years old, or 50, who look much older than certain other people who we know are actually in years much more advanced. What is this early aging due to? We cannot dispose of a question of this magnitude at the present time. We have a great deal of knowledge of nutrition, technical knowledge of nutrition, based on animal experimentation, and correlated with other of human experience to a certain degree, but we are still in the progressive stage in this.

But we have an immense amount of actual observations on the entire span of life of experimental animals which shows that early breakdown and development of the symptoms of old age at a period of one-third or a quarter of the normal span of life of which that species is capable is brought on by faulty diet. How far does this apply to human problems? Statistical studies have shown how many people are trying to live on a diet, rolled oats and meat and tuber or root diet, which is unsatisfactory for experimental animals. Are we to assume so far as data have been collected and the results of animal experimentation correlate very well with human experience that it does not correlate in the field where we can still gain considerable knowledge? I think not.

It is that group particularly who are industrially employed, whose earnings are fairly low, who confine themselves to this cereal and meat and tuber type of diet, that go down with tuberculosis and with other

diseases at an early age and show signs of early age; early as the statistics of insurance companies just mentioned, show. All these correlate so well with animal experimentation, that I am inclined to think that since we know that large groups of people are living on that diet, that the early ageing we have observed is in a great measure the result of a faulty diet. I believe this so strongly that I have been giving a considerable amount of attention to urging the public to use more of those foods which in our experience with animals improve the diet and well being of the animal and prolong the period of youthful vigor and postpone the onset of old age.

Q. By that you mean that in your opinion the use of milk and dairy products would postpone the onset of old age?

A. I think there is but little question that that is true.

Q. In the case of infants and the children after weaning, we will say after the age of two years; do you consider that the growth of that child will be retarded if it does not use a sufficient quantity of milk?

A. There is no question in my mind that that is true. I make that statement on the basis of a very considerable number of observations of children in Baltimore.

Q. Will you state what those observations were?

A. In one series of observations I examined the children in a certain orphan home in Baltimore. These children are fed almost entirely on a cereal and meat diet. They are surprisingly undersized; tuberculosis is astonishingly prevalent in that institution, although the hygienic conditions are everything that could be desired; the building is relatively new, a lot of air; it has the best toilet facilities and surrounded by acres of playgrounds with woods on it, and the children run out doors and play when they are very small. Some months ago I secured by private gift, funds for the feeding of these children so far as these funds would go, and unfortunately, they did not reach throughout the institution. But I have selected about one-half of the children between four and five years of age and have been giving them for about five months now, a liberal amount of milk in addition to the cereal and meat diet which the institution itself regularly feeds them, and that is the same as fed to the rest of the children in that institution, that is, with cereal and meat diet. And we have kept accurate measurements of weight and height, of certain simple strength tests, the muscles of the arms and legs of a similar group of about forty which the institution has continued to feed. These two groups contrast in the most remarkable fashion; those which we fed a liberal amount of milk in addition to what the institution was feeding have responded in nearly all cases except in three or four where the children are badly infected with tuberculosis. Their response and gain in weight was unbelievable unless you could see the tables.

On the other hand, there was scarcely any growth in any of the forty, or forty-one to be exact, of the children still fed on the cereal and meat diet by the institution. Only three or four children have made any appreciable gains, and those apparently have made their gains because the parents frequently visited them bringing them some food. It is a form of demonstration which has been of great value to me in convincing me that the general theory which I have set before you is correct. I have also a large number of observations on children in a certain Jewish school in Baltimore which shows 50 per cent. of them to be 25 or 30 per cent. under weight for their age and height.

Q. Do you know of any evidence that undernourishment is of common occurrence in children who are not properly fed on milk?

A. There has been a general awakening in several cities during the last few years in the matter of the interest of child welfare and conservation of child life. This is not only true in America, but the world over, as is shown by the activities of the Red Cross in various places in trying to rescue child life from its dangers. There have been medical examinations in various cities of all the school children, or a large number of them, and I have in mind particularly New York. I cannot state exactly now the per cent. of undernourishment in the total number examined. If I remember correctly, there were approximately seventy-five thousand school children examined a year or so ago, and I believe there were 21 per cent. undernourished. There have been made very extensive observations of children in Seattle, Washington, not only with respect to undernutrition, but especially the condition of the teeth of children, which is a very good index of the physical development of the child.

Q. Do you think it is a desirable thing that there should be a systematic effort to weigh and measure school children?

A. The measurement, or I think the weight and the accurate recording of those observations, together with such other medical observations as it may be possible to make on all school children in every city and hamlet of this land, is one of the most important duties of the government. It should be the attitude of local authorities to carry that out in every instance. We have no moral right to allow children to grow up on faulty diets which make it impossible for them to develop as well as their capabilities make possible.

Q. You think that such a systematic weighing and measuring would be a great help in revealing the presence of under-nourishment?

A. There is no question about that, and interest in this matter is now manifest in various communities, and there can be no question but that it would be of great value in aiding us in further correlating the data which we have obtained from animal experiment to human problems.

It will enable us to determine more or less exactly the gravity of the situation which exists in various places in human nutrition.

Q. Do you believe that this deficiency in diet is very widespread and very common at the present time?

A. I believe that it is.

Q. Both in adults and children?

A. Yes.

Q. How much milk do you think an adult ought to drink a day to keep himself in good condition?

A. I have believed for two or three years that the more nearly an adult or a child approximates the taking of a quart of milk a day, the better off he will be.

Q. You would prescribe a quart of milk a day?

A. I would.

Q. For every adult and every child?

A. Yes. I believe that so much that I have adopted that regime in my own dietary habits, and several people who have worked with me who have studied the diet as I have, have also been so convinced as to do likewise.

Q. You do not think there is any substitute for the growth promoting substance in milk that can be found in any other way?

A. I would prefer to answer that question by saying that this matter was discussed last December at Chicago, at a meeting of a group of about twelve men, bacteriologists, health officers, and physiological chemists, and students of nutrition; a group of men known as the National Commission on Milk Standards which was organized by and is financed by the New York Milk Committee. This group of men discussed that question in Chicago last fall and arrived at the unanimous conclusion that milk is the only food for which there is no effective substitute.

Q. And what is your opinion regarding the cost of milk at the present time as compared with the cost of other foods? Have you looked into that question?

A. Yes. At the present time milk is one of the most economical food stuffs. That fact is not generally realized, but I feel it is the consensus of opinion of those who are qualified by technical education to judge this matter; I think they will all agree that even at the present high prices, milk is an economical food to purchase.

Q. Now, as I understand it, you look on milk as a necessity for the young and old, a vital necessity?

A. I do.

Q. You believe that the human race cannot get along very well without it?

A. I believe we will not achieve the maximum well being of which we are capable, unless dairy products are used in the diet.

THE FEEDING OF OLEOMARGARINE COMPARED WITH THE FEEDING OF BUTTER IN ONE OF ROCHESTER'S INSTITUTIONS

In connection with the inquiry as to the milk supply of Rochester institutions, a most interesting piece of information was obtained from the Jewish Orphan Asylum by Mr. J. H. Larson, Secretary of the New York Milk Committee, who had charge of that branch of the Survey. This institution at the present time has a population of 29 children under 16 years of age, and 10 adults. For a number of years the management has made a practice of regularly taking the weights and measuring the heights of children there and recording these weights and heights in the institution's records. The diet furnished to the children has been uniformly good. The daily milk supply at present is 25 quarts, of which 8 quarts are used for cooking, 14 for children and 3 for adults.

During the period of 6 months previous to January 1st, 1917, there were no changes made in the diet of the children of this institution. They were receiving among other things regularly a sufficient quantity of butter. On January 1st, 1917, the management decided to substitute oleomargarine in place of butter, and for the following six months, that is to say, from January 1st, 1917, to June 29th, 1917, the institution was supplied with oleomargarine instead of butter. At the end of June, the management became dissatisfied with the oleomargarine and decided to abandon its use and return to a regular butter supply. No other changes than these were made at any time in the diet or in the milk supply.

Records of the weight of 10 children who were in the institution continuously during the periods above mentioned are given in Table No. 20:

TABLE No. 20

AGE.		WEIGHT.					HEIGHT.			
Sex.	12-31-16	12-31-16	7-1-17	12-30-17	6-29-18	12-27-18	7-1-17	12-30-17	6-29-18	12-27-18
1. Boy	13 $\frac{2}{12}$	70.75	77.5	88.	84.75	91.25	56.25	58.	60.	61.25
2. Boy	14 $\frac{3}{12}$	90.	94.	102.	100.50	..	59.50	61.	62.75	..
3. Boy	8 $\frac{3}{12}$	..	56.	58.50	54.25	60.25	48.25	48.75	49.25	50.
4. Girl	8 $\frac{6}{12}$	52.75	52.75	56.25	55.	62.50	50.25	51.25	51.75	52.75
5. Boy	10 $\frac{6}{12}$	54.75	54.50	60.	57.50	65.50	50.	51.25	52.	53.
6. Girl	9 $\frac{6}{12}$	63.	67.50	73.75	71.	82.	54.50	56.	57.	58.
7. Boy	10 $\frac{8}{12}$	70.75	77.25	79.75	78.50	82.25	54.75	56.50	57.	57.50
8. Girl	16	104.50	..	72.	70.25	75.	..	54.25	54.75	55.25
9. Girl	14 $\frac{3}{12}$	99.50	104.25	116.50	123.	132.	61.25	62.50	63.	63.50
10. Boy	11 $\frac{4}{12}$	66.	67.50	71.25	66.25	77.37	54.	55.	55.25	56.25

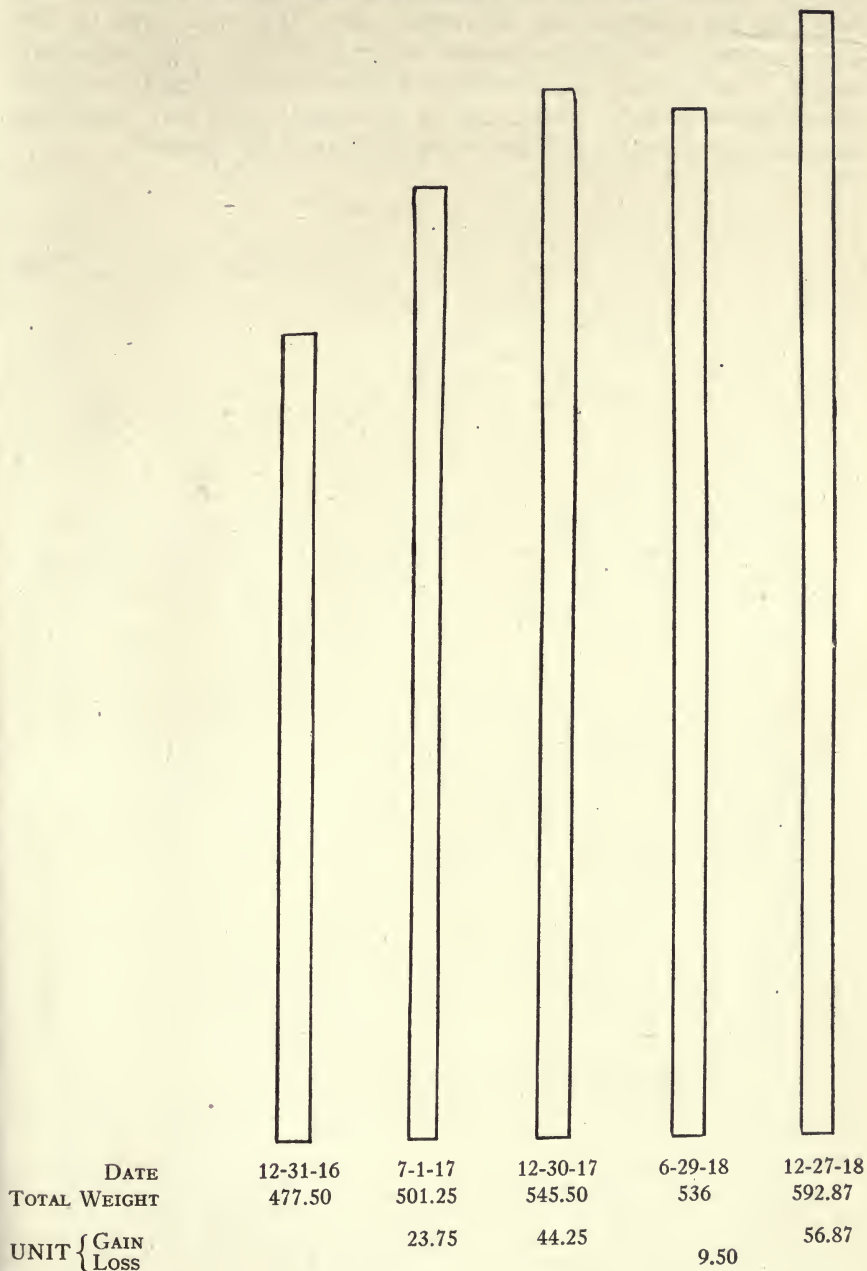
A tabulation of the weights of seven children whose records were complete for the five periods of six months each, is summarized below:

Date.	Total Weight of Seven Children.	Loss or Gain.	Butter or Oleomargarine
Dec. 31, 1916	477.50 pounds		Butter Period
July 1, 1917	501.25 pounds	+23.75 pounds	Butter Period
Dec. 30, 1917	545.50 pounds	+44.25 pounds	Butter Period
June 29, 1918	536. pounds	— 9.50 pounds	Oleomargarine Period
Dec. 27, 1918	592.87 pounds	+56.87 pounds	Butter Period

In the list of children there was one girl who was extremely large for her age and growing so rapidly that she would be called super-normal. Her increase in weight was not seriously interrupted by changes in diet. The results of these observations are graphically illustrated in the diagram on next page.

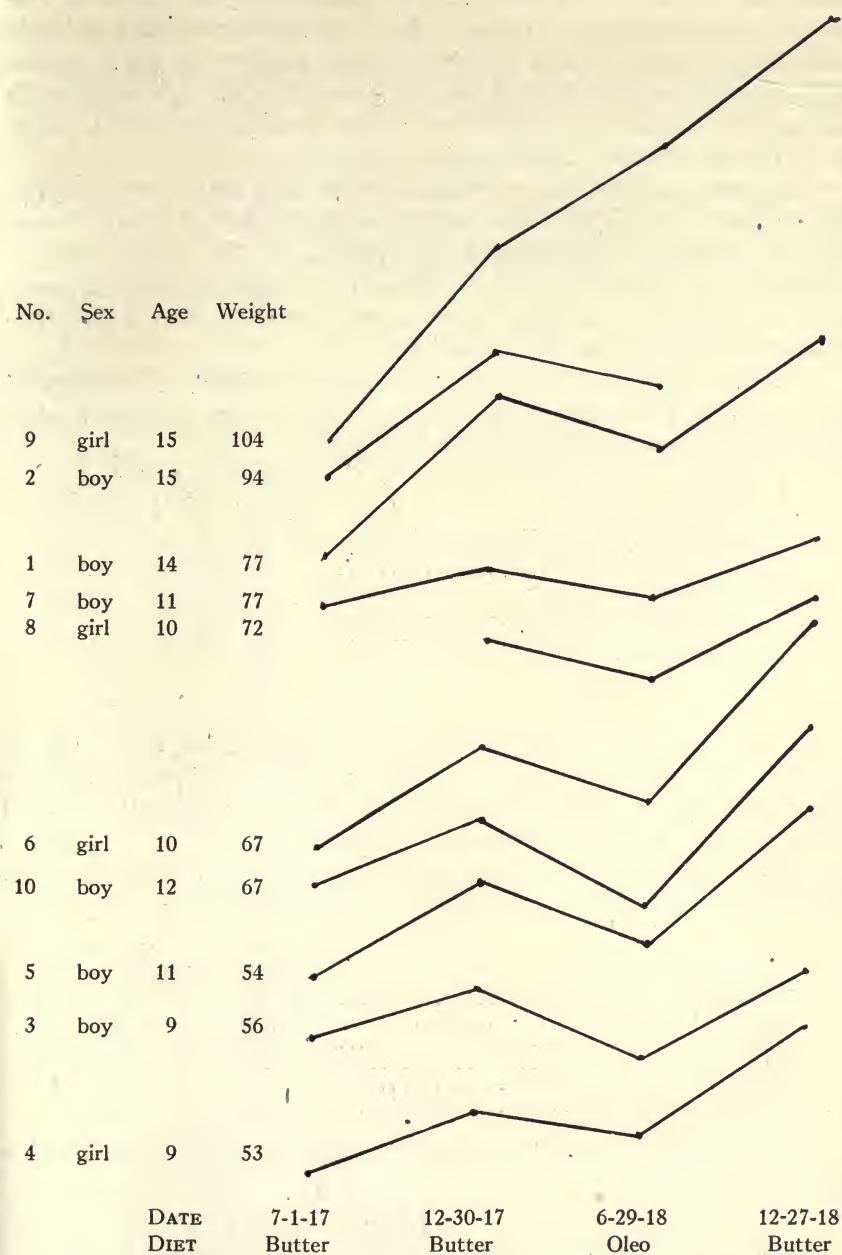
TABLE No. 21

GROUP OF SEVEN NORMAL CHILDREN WHOSE RECORDS WERE
COMPLETE FOR FIVE SIX-MONTHS PERIODS



The same children's individual weights for the six months during which oleomargarine was fed, and for the six months when butter feeding was again resumed and oleomargarine feeding was abandoned, are shown by the curves in the following chart. It is noteworthy in this chart that with the single exception of the girl No. 9, who was super-normal in her growth, the other nine children all lost weight during the oleomargarine period. In the case of the super-normal girl, the curves show that her growth was slightly checked during this period.

TABLE No. 22



While the number of these children was not very large, yet the uniformity of results during the different periods makes it necessary to believe that some common cause existed for their losses and gains in weight. Since there were no apparent changes in diet with the exception of the substitution of oleomargarine for butter, it seems fair to conclude that the lack of butter in the diet was a large factor in the loss of weight during the period when oleomargarine was fed.

As already pointed out by Professor McCollum and other observers, when rats are fed on cotton seed oil or sunflower seed oil or other vegetable oils which are contained in large quantities in some brands of oleomargarine, they failed to grow and showed a stunted, unhealthy appearance, but when fed on butter fat in connection with other foods, they attained full growth and fine condition.

Professor Henry C. Sherman, in his book entitled, "Chemistry of Food and Nutrition," shows the cost of 3,000 calories of energy when purchased in the form of various food products:

Food.	Price Per Lb.	Cost of 3,000 Calories.
Clear Fat Pork.....	\$.20	\$.16
Bacon	.25	.27
Round Steak plus Fat.....	.20	.88
Round Steak Lean	.20	1.26
Eggs (8 at 36c per doz.).....	.24	1.13
Oysters (at 30c qt., 1 pt.).....	.15	1.90
Milk—1 pt. at 6c qt.....	.03	.28
Milk—1 pt. at 8c qt.....	.04	.37
Milk—1 pt. at 10c qt.....	.05	.46

In reviewing these figures, Professor Sherman shows that people can afford to pay 20c per quart for milk if they can afford to pay 25c per pound for beef. The above statement is limited strictly to the food value of milk from the standpoint of calories.

At Rochester prices for November, 1919, for the principal products in the above table the same would give the following figures:

Food.	Price Per Lb.	Cost of 3,000 Calories.
Fat Pork	\$.40	\$.32
Bacon	.35	.38
Steak, plus Fat	.42	1.85
Steak, Lean	.40	2.52
Eggs, 8 at 75c per doz.....	.07	3.52
Milk, 14c qt.—1 pt.....	.07	.65

Professor M. J. Rosenau of Harvard University, states that the value of milk is as follows:

A glass of milk is about equal to...

- { 2 large eggs,
- a large serving of lean meat,
- 2 moderate-sized potatoes,
- 5 tablespoonfuls of cooked cereal,
- 3 tablespoonfuls of boiled rice, or
- 2 slices of bread.

In testifying before the Mayor's Committee on Milk, New York, 1917, Dr. L. Emmett Holt, one of the leading specialists in children's diseases, stated as follows:

"For infants during the first year, a quart of milk a day is necessary. For the second year, a pint and a half. There is no food as economical at present prices for the nutrition of infants as milk. * * * The habit of giving tea and coffee to young children is positively injurious. For children between the ages of two and six years, the daily ration of milk should be one pint per day as a minimum.

"Dr. Lucas, of Berlin, found very greatly increased susceptibility to tuberculosis as a result of under-feeding particularly among children. I should think that after six years of age up to twelve or thirteen years, a pint of milk a day ought to be allowed to all children."

Professor Graham Lusk of Cornell University, in his testimony (before the same Committee), said:

"We cannot expect a good community dietary if that community uses less than one-half quart of milk per capita per day. Unless there was that amount of milk, the dietary would be seriously one-sided. The milk has exceptional value as a food for growth due to the so-called vitamins. * * * It is the most important single food for adults. It is more economical to produce than meat. A man confined to a bread and meat diet will show deficiencies, while a man confined to a corresponding bread and milk diet will go on indefinitely. * * * A vegetable diet will always be improved by an addition of milk. If it was a question of one or the other, I think it important that a man have milk rather than meat."

Professor Graham Lusk of Cornell University, in his testimony (before the same Committee), said:

"No family of five should buy meat until they have bought at least three quarts of milk. Milk contains not only protein of animal origin, but also a very valuable fat which has specific properties for growth. It also contains in aqueous solution, materials which prevent the development of beri-beri and pellagra. Milk is the cheapest form of protein you can get. It is the most complete and sufficient food that can be had. Around the dairy farms centers the proper nutrition of a nation."

If the quantity of milk recommended by Professor Sherman and Lusk were used by the consumers of Rochester, the city would consume the following amounts daily:

Age.	Population.	Quantity Per Person.	Total.
Under 1 year.....	9,854	1 quart	9,854 quarts
1 to 6 years.....	65,720	$\frac{3}{4}$ "	49,290 "
7 to 16 years.....	70,119	$\frac{1}{2}$ "	35,059 "
Over 16 years.....	144,307	$\frac{1}{4}$ "	36,076 "
	290,000		130,279 "

The present average supply is estimated at 90,000 quarts of milk daily. The figures in the above table indicate therefore that the children

and adults of Rochester should use at least 40,000 quarts more milk than they now consume. The milk recommended for children under one year if not consumed directly by the child should be consumed by nursing mothers if the child is to receive proper nourishment. The latest researches of Professor McCollum, as testified to by him, indicate that every person can consume daily one quart of milk or its equivalent in other dairy products to the advantage of their health and strength. These other products refer to butter, cheese, condensed milk, cream, etc. If Rochester should follow the advice of Professor McCollum it would therefore consume daily 290,000 quarts of milk, or its equivalent in dairy products.

Dr. John R. Williams of Rochester, in his testimony at a public hearing held in the City Hall on August 13, 1919, made the following statements regarding the food value of milk:

I would like to introduce a photograph here in evidence, if acceptable, showing the value of milk for children. I have here a photograph of six children; three of them have been fed or liked milk and were fed liberally on milk from early infancy right up to the present time; the other three were not fed on milk, they took a dislike for it and were not encouraged to use milk, and the result is that the children not fed on milk show a lack of vitality and a lack of growth, which was very strongly absent with milk-fed children. The parents of the children who were fed on milk are smaller than those of the children not fed on milk and these children are the same age by pairs.

I found a large number of children were using condensed milk in my study of conditions in Rochester. I appealed to the wholesale grocers of Rochester and they were able to tell me—there was practically no condensed milk imported into Rochester by jobbers that practically all the condensed milk sold here was sold through wholesale grocers, and they gave me access to their figures, and they told me that condensed milk was sold in Rochester to the extent of two million cans a year, and I found a large number of people were using condensed milk.

Q. What do you say about the use of condensed milk, doctor?

A. I think it is much inferior to cow's milk.

Q. In process, it is sweetened?

A. Yes, I think its food value is much inferior; I think it lacks the essential properties of growth production.

VII

RELATION OF MILK TO INFANT MORTALITY

Much has been written upon this subject, and the literature is so full of material prepared by the leading medical and public health experts of the world that the subject is familiar to everyone who has given any attention to the relation of public milk supplies to the public health.

The authorities are unanimous in agreeing that there is a close relationship between infant mortality and the quality of the milk used by any city. It will be sufficient for the purposes of this Survey to quote the testimony of Mr. John H. Larson, Secretary of the New York Milk Committee, who, because of his position and the work of that committee, has for a number of years given special attention to this subject:

JOHN H. LARSON, produced as a witness on behalf of the Committee, first being duly sworn, examined by Dr. North, testified:

Q. Mr. Larson, will you state briefly your previous experience in connection with milk investigations and your present position?

A. I am the Secretary of the New York Milk Committee and have been connected with that organization since 1912.

Q. Will you state what that organization is?

A. It is an organization to promote the welfare of children in New York City and throughout the country by encouraging a safe milk supply for the children, and other methods of preventing infant mortality.

Q. Will you state briefly what that organization has done since you have occupied the position of Secretary, before and since?

A. I think I better begin at the beginning. The New York Milk Committee was originally organized because the milk supply of New York City was not deemed fit for infant feeding, for the feeding of infants who were not breast fed. The primary object was to educate the public to demand a supply that was safe for their children. In order to do this we started two things; one was the infant milk stations in New York City; they were conducted up until and including 1911, when they were taken over by the city.

Q. Are those stations still operating?

A. Yes, the City of New York is operating sixty of them today.

Q. They are still selling milk in bottles to the mothers of those babies?

A. Yes.

Q. How much less does that milk cost than the milk delivered to the home?

A. Two cents less than Grade A pasteurized delivered to the home, or ten cents less than certified.

Q. Do you know whether that milk has been sold from these stores at a loss?

A. The milk stations?

Q. Yes.

A. No, it has not.

Q. Is it not true that the city pays part of that expense?

A. * * * the milk is dispensed in each milk station for which the city pays the rent.

Q. The city pays the rent of the stores?

A. All the overhead charges.

Q. For light and heat?

A. Yes.

Q. And janitor services?

A. Yes.

Q. Then these charges are contributed by the city?

A. The city contributes to the expense of dispensing that milk in order that it may have an inducement to get the mother to come to the station; it is a paying proposition for Father Knickerbocker.

By *Mr. Fuller*:

Q. All these expenses are paid by the city?

A. I do not believe that the company loses money on its contract.

Q. The point is here; the city pays certain overhead charges?

A. No. The city has its milk station and it tells the milk companies of New York City, "We want milk dispensed at these stations; what is your bid for dispensing it, Grade A pasteurized milk?" And the company send in their bid; one of the companies gets the contract, and the city says, "We put at your disposal this station to dispense your milk; we will not charge you any rent, or for light or heat or janitor service; the reason we do that is having milk on sale in the station for the babies is an inducement for the mother to come to the station for instructions for the infants."

Q. What does the company furnish milk for?

A. Fifteen cents at the present time.

By *Dr. North*:

Q. They charge fifteen cents also, do they not, to the mothers?

A. It is not delivered at the station; it is delivered to the mother at the station.

Q. The mother pays fifteen cents a quart?

A. Yes.

Q. Do you know what it would cost if the station charges were added to that, to sell it through those stores?

A. No, I do not.

Q. Have you got figures to show what it cost the city to operate those stations?

A. I have got figures to show what the station operation costs, yes, but they are grouped; do you want that now?

Q. Perhaps we might as well have it now as long as you are on that subject?

A. Let me give you this first, getting back to the cost of the milk to the mothers; in 1911, 1912, 1913, 1914, 1915 and 1916, it was 8 cents a quart.

Mr. Pierce: Grade A pasteurized?

Witness: Yes.

In 1917 it started with 9 cents, $9\frac{1}{2}$, $10\frac{1}{2}$, 12 and $12\frac{1}{2}$. In 1918 it started with $13\frac{1}{2}$; went down to 12, $12\frac{1}{2}$, 13, 15 and 16. In 1919 it started with 14 cents, and today it is 15 cents a quart.

Q. Those changes were due to changes in the market price of milk?

A. Yes.

Q. What did the New York Milk Committee, which you represent, have to do with the establishment of these stations?

A. They started the milk station experiment in New York City.

Q. How many stations did they establish of their own?

A. Thirty-one.

Q. Before the city took them over?

A. Yes, and they added to them since until now they have sixty.

Q. About how many babies a day are fed at these stations?

A. In 1918 there were 46,182 individual babies.

By *Mr. Pierce:*

Q. A quart to a child?

A. In 1918 there were 5,815,425 quarts of milk dispensed.

Q. Have you analyzed that to show what is given to a child?

A. Per capita daily? No, I have not; it does not mean that each one of those babies had a quart of milk a day during the year, but there were that many individual babies registered at the stations.

By *Dr. North:*

Q. Do these stations operate the year around?

A. They do, yes.

Q. Are they so located that children in any part of the city can get milk there?

A. No, I would not say that; they are located according to the need of the community. If you have a community where there are ten children that need milk stations very badly you would not prefer that community in locating a station to a community that had a thousand

children needing it very badly. Milk stations favor congested sections where the baby population need milk station service.

Q. That is, the stations are located in the most congested districts?

A. Yes, in those congested districts the milk stations are always within walking distance of any mother in the district.

Q. Now, were the Milk Committee's expectations realized in the establishment of these stations by any marked effect on infant mortality?

A. Yes, they were.

Q. Suppose you go into that very fully?

A. Perhaps we can cover that very briefly by giving the infant mortality rate. The rate in New York City for 1906-1910, that is before the milk station period, was 135.8; that is, out of every thousand babies 135 died under one year of age; 1911-1915, you recall that the milk station drive was in 1911, the infant mortality rate was 102.2 per thousand; in 1916 it was 93.1; in 1917, 88.8; in 1918, 91.7. The milk stations in New York City have helped reduce the infant mortality rate since 1910 from 135 to 91.

By *Mr. Pierce*:

Q. How much do these stations cost the city per year?

A. The milk stations today are costing the city, each station in round numbers, \$3,000 a year; that includes nursing, cleaning, medical and immediate supervision, but does not include the pro rata distribution of the Health Commissioner's salary nor the salary of the Chief Director of the Bureau of Child Hygiene.

By *Mr. North*:

Q. Is that the average cost?

A. \$3,000.00 is the average cost. A station of two hundred babies can get along with one nurse and a part time doctor; a station of six hundred babies will require a nurse, two assistant nurses and a doctor, that has at least two or three clinics a week.

Q. The salaries of those nurses and doctors are all paid by the city?

A. Yes.

Q. Are they open all day or only in the morning?

A. They are generally open only in the morning and the nurses are out in the field visiting mothers and babies in the afternoon, until late in the afternoon when they come to the station and fill out their records.

Q. Do the mothers bring the babies to the stations?

A. Yes, for the baby clinics.

Q. Have you got a compilation showing the work that has been performed by these stations and the number of babies that have been taken care of by each station?

A. I have a very complete cost sheet here of our 31 stations; of course, that does not apply today except in proportion as to what costs

were at that time. I think for the benefit of the record it might be well to put in, that during September, 1911, our 31 stations cost \$9,227.35. It does not show here the number of babies, but the number of babies were 31,128, I think, something like that, but the cost per baby was .0634, that is, it is six and one-third cents a day was the actual cost to us.

Q. To take care of one baby?

A. One baby for one day.

Q. Is there any way in New York City that the infants and children can get milk as cheaply as they can get it at the milk station?

A. No, there is not.

Q. There is no way?

A. No.

Q. They are getting the cheapest milk there that they can get of that grade?

A. For the quality. May I add there that the charge is sometimes made that the milk dealers are killing the babies because of the high price of milk. My personal opinion is that milk dealers killed the babies of New York City when they were selling milk at 4 cents a quart. During those times the infant mortality rate was over 200 per thousand.

Q. How do you account for that?

A. That milk cannot be produced and sold and delivered to the consumer in a sanitary character and was not so sold and delivered when milk retailed at four cents a quart. The result was that milk contributed, because of its unsanitary character, to the high infant mortality rate. New York City has the best, or as good a milk supply as any other city in the world, and has the least infant mortality rate of any large city in the world. It is all because of the fact that the people of New York City have been educated to realize the value of a safe milk supply for infants' feeding.

Q. You consider the quality of the milk has got to be taken into consideration in feeding infants and children as well as the price?

A. I think the quality of the milk comes far before the price. Price has nothing to do with it if the quality is not there.

Q. What kind of milk were the people buying for their infants and children before these stations were established?

A. Milk that would not to-day, according to all the recommendations of the National Commission on Milk Standards, come up to Grade C pasteurized.

Q. The lowest grade of milk sold in the city?

A. Yes.

Q. Where were they getting it?

A. There were a lot of small dealers in the city, a lot of dairy

farmers surrounding the city hauling their milk in, or in most cases the producer was the milk dealer as well.

Q. Was this milk delivered to the homes of the people or did they go to the stores to get it?

A. They went to the stores to get it.

Q. Does New York City permit the sale of dipped milk at the present time?

A. Unfortunately, yes.

Q. Is that dispensed in grocery stores?

A. Yes.

Q. Has the Milk Committee disapproved of the distribution or dispensing of dipped milk?

A. We disapprove of the dispensing of dipped milk. Milk cannot be safely handled except in a single container.

Q. Has the Milk Committee any evidence that the children that have been fed upon dipped milk from grocery stores are any worse off than those that have been given bottled milk from the infant milk stations, or that have been fed upon good bottled milk?

A. I have not just the figures with me, Dr. North, but my impression is that the baby death rate among the babies fed at our milk stations on Homer milk was 57 per cent. lower than the baby death rate throughout our city fed on good and bad milk.

Q. Has the Milk Committee in its work taken into consideration the records made by other investigators in New York of the mortality of children fed on loose dipped milk from grocery stores as compared with the mortality of children fed on good bottled milk; for example, such work as was done by Dr. Park and Dr. Holt?

A. Yes, it has those records.

Q. Now, will you tell us something about the effect or influence on infant mortality of this system of infant feeding. I think you have some mortality records to show us there, of the results of infant feeding?

A. In 1913, 54.8% of the babies at the milk stations were breast fed. In 1918, 67% were breast fed. In 1913, 19.6% of the babies were mixed fed. In 1918, 17% were mixed fed. In 1913, 25.5% were bottle fed. In 1918, 16% were bottle fed. It shows that the educational propaganda for the benefit of the mother, through the milk station, has induced the mothers of New York to increasingly nurse their babies at the breast, and the mixed feeding percentage of mothers has decreased, and the bottle fed percentage of mothers has decreased. Now, what is the purpose of that? In our work we found that of the babies registered at our stations who died, 6.5% were breast fed, that is, the infant mortality rate per thousand breast fed babies registered at our stations was 6.5;

that is, this much out of a thousand, or 11 out of two thousand died. Of the mixed fed babies, 24.2 per thousand died. Of the babies that were bottle fed, 30.7 per thousand died. Your mortality problem limits itself to the infant that is artificially fed. The ratio—do you want this put in record?

Q. Yes, sir?

A. The ratio of deaths of these three groups of feeding are as follows: For every breast fed baby, four mixed fed babies die; for every breast fed baby, I mean, every breast fed baby that dies, four mixed fed babies die; for every breast fed baby that dies, five bottle fed babies die. You have ten babies who die; one of them is breast fed; four are breast and bottle fed, and five are bottle fed. If any community will realize and understand that fact, that in itself will do a whole lot to prevent this unnecessary loss of infant life.

Q. Do these stations sell milk for the mothers themselves to drink?

A. They do. I am under the impression that a very great percentage of the milk supply that goes through the stations in New York City goes to the mother rather than the baby.

Q. Do you consider that the establishment of those infant milk stations in New York City is a success?

A. I do.

Q. And do you think that every city should have such stations?

A. The problem is a problem of ignorance. Infant mortality per se is not a milk station problem. Milk stations will prevent unnecessary loss of infant life more quickly than any other agent that can be used. As I said before, you have got to have that milk as a bait to get the opportunity to educate the mother in the care of her infant and herself.

Q. Supposing you consider the milk as a commodity offered for sale to the mothers of infants in the congested districts, would you say that the City of New York is justified in paying the cost to maintain these stations so that this milk can be sold at the lowest price to the infants and mothers?

A. I would, yes.

Q. You think the city is justified in paying that charge?

A. I think it is a mighty good investment for a city.

Q. Now, can you show us something about the mortality under one month?

A. The actual condition is this: This chart shows what happens to one thousand expectant mothers in New York City. Assuming that you have a thousand mothers that are pregnant and you have control of them until one year after the birth of their babies, this is your result: Out of that thousand, 4.7 mothers die from causes due to pregnancy and

confinement; 43.4 of those mothers give birth to still born babies, their babies are dead before they are born; 35.2 of those mothers lose their live born babies through death during the first month of birth. Ignoring the fact that five of the mothers die and take your potential baby lives from conception until one month after birth and you divide them into three groups of those who die; one-third are born dead; the second third die during the first month after birth, and the last third die during the remaining eleven months of the first year. Two-thirds of those potential lives are gone before there is any possible chance of them availing themselves of the milk station machinery. That is for New York City.

Mr. Pierce: That is, two-thirds of those who die?

The Witness: Yes.

Q. Then in our figures that we have been considering on infant mortality which has been the cause for this milk agitation, two-thirds of the children who die have no relation at all to the milk agitation?

A. Not in the least.

Q. They die before the end of the first month?

A. They do.

Q. Then, only one-third of the number of children that have been quoted so often as the reason for the milk agitation really have anything to do with the milk supply?

A. Just one-third, yes.

Q. Now, have you some more figures on that point?

A. I have the same figures for the City of Rochester that I have just quoted for New York City. This is from the vital statistics of Rochester for 1917: Out of one thousand expectant mothers in Rochester that year, 4.6 died from causes due to pregnancy and confinement; 39.0 gave birth to dead babies; 40.9 lost their babies through death during the first month after birth. You have the grouping in three groups, the same here as in New York City. In New York City the line goes down gradually from the second month down; in Rochester it does not do that; the second month is lower than the third month, and the fourth month is lower than the third or fifth month; this is pro-rated from the sixth month on, because my figures do not have the exact distribution, but it shows graphically what the situation is.

Q. That is to say, in Rochester one-third of the babies who die under one year of age are babies who would be affected by the milk supply?

A. Yes.

Q. And two-thirds are not affected?

A. Are not affected.

A. The problem, then, in infant mortality does not concern itself

only with that last and third group of babies that die; it concerns itself far more with the two previous groups. The New York Milk Committee realized that fact when it started the milk stations in New York City, but it also realized that it could not go back so far as to reach with medical nursing and care the expectant mother unless it had the milk station with its milk as a bait for getting the mother with the baby. That was the third group. Consequently, in connection with the milk stations we started a program of providing pre-natal care for expectant mothers; the mother took the milk, brought the baby to the milk station and the nurse found out she was pregnant and she would get her registered as an expectant mother and she would be provided with care during her pregnancy and for one month after her confinement. That is the outline of the work. What did that work accomplish? It means that the group of mothers which now, I think, run between seven and ten thousand on our records, it means that the maternal deaths of our mothers receiving pre-natal care, show a reduction of 69 per cent. over maternal deaths throughout the city as well.

Q. That is the mothers who patronize those stations?

A. Yes, and who receive pre-natal care. It means that the records show a reduction of 22 per cent. in still births; it shows a reduction of 28% in the deaths under one month. All told, it caused a reduction of maternal deaths of 69 per cent.; of still born babies, 22 per cent.; of deaths under one month of 28 per cent.

The position occupied by the City of Rochester among American cities in the number of infants under one year of age who die annually has often been thought to be a position of leadership; that is to say, that Rochester, if not at the top, is near the top of the list because of the exceedingly small death rate of children under one year.

Because of this impression, it will be useful to refer to the annual report of the New York Milk Committee which shows the infant death rate, under one year, in all of the large cities of the United States. In their report of the figures for the calendar year 1918, the position occupied by the principal American cities and the death rate of infants under one year is shown. Extracts from this report, showing exactly the position which Rochester now occupies, are given in the tabulation below, which shows that Rochester is 54th in the list of cities from which statistics were compiled for 1918 by the New York Milk Committee:

INFANT MORTALITY STATISTICS

For the Year 1918

City.	Deaths Per 1,000 Infants Under 1 Year of Age.
1. Brookline, Mass.	35.4
2. Madison, Wis.	38.1
3. Pasadena, Cal.	43.8
4. East Orange, N. J.	53.0
5. Berkeley, Cal.	56.5
6. San Francisco, Cal.	57.2
7. Malden, Mass.	60.2
8. Everett, Mass.	61.6
9. Alameda, Cal.	62.2
10. Salt Lake City, Utah.	63.3
11. Boise, Ohio	63.4
12. Seattle, Wash.	63.4
13. Chelsea, Mass.	65.8
14. Newport, R. I.	65.8
15. Newton, Mass.	66.6
16. Quincy, Mass.	67.2
17. Lima, Ohio	69.2
18. Grand Rapids, Mich.	70.8
19. Portland, Ore.	71.7
20. Evansville, Ill.	72.2
21. Reno, Nev.	72.3
22. Minneapolis, Minn.	72.3
23. Oakland, Cal.	72.7
24. Haverhill, Masss.	73.0
25. Mt. Vernon, N. Y.	73.6
26. San Jose, Cal.	76.5
27. Lynn, Mass.	76.8
28. Canton, Ohio	77.0
29. Los Angeles, Cal.	77.4
30. Decatur, Ill.	78.1
31. Fort Wayne, Ind.	78.7
32. Spokane, Wash.	79.4
33. Joplin, Mo.	80.6
34. Wichita, Kan.	81.3
35. Lincoln, Neb.	81.8
36. Stamford, Conn.	82.8
37. Concord, N. H.	83.4
38. Poughkeepsie, N. Y.	83.8
39. Dayton, Ohio	84.0
40. Duluth, Minn.	86.0
41. Galveston, Tex.	86.1
42. St. Paul, Minn.	86.4
43. Jamestown, N. Y.	86.6
44. Amsterdam, N. Y.	86.9
45. Quincy, Ill.	87.0
46. Springfield, Ohio	87.2
47. Peoria, Ill.	89.3
48. New Haven, Conn.	89.5
49. Jackson, Mich.	90.2
50. San Diego, Cal.	91.5
51. Sacramento, Cal.	91.6
52. New York, N. Y.	91.7
53. Harrisburg, Pa.	92.1
54. Rochester, N. Y.	93.4

VIII

COST OF PRODUCING ROCHESTER MILK

The determination of the cost of milk production presents many serious difficulties. The majority of dairy farmers do not keep cost accounts. On the other hand, there is no class of business men who carries so many business transactions in his head, or can give more accurately from memory the history of financial transactions than the dairy farmer. The different sizes of dairy farms, the different conditions of location and soil, the methods of feeding, sizes of herds, amount of labor employed, vary to so great a degree that the figures for each farm differ to a considerable extent from the figures obtained from other farms in the list. An entire year's accounting must be obtained from each farm investigated if the figures are to fairly represent the average cost, for the reason that seasonal changes greatly affect volume of milk produced and the cost of feed.

In approaching the organization of this work, it was recognized that consideration should be given to the methods of investigation previously used. It was believed by the Director of the Survey that the best insurance that could be given to the correctness of the methods adopted for the present inquiry would be obtained through consultation with Professor G. F. Warren, Professor of Farm Management, at Cornell University, because he is recognized as the highest authority in this country on farm economics. At the request of the Director of the Survey, Professor Warren came to Rochester and furnished copies of the report blanks used by him in his own inquiries of the cost of milk production. He also designated some of his own assistants to furnish further advice on this subject. H. E. Babcock, State Director of Farm Bureaus, volunteered to secure for the Director of the Survey men who had been engaged in country farm bureau work and had had extensive experience in compiling farm cost accounts. As a result of this co-operation, four inspectors were employed who could qualify in an unusual manner for work of this character. These men were in the field for an average period of nine weeks, and during that entire time were engaged in making detailed studies in consultation with dairy farmers as to their cost items.

The preparation of the report blanks used by them was done after consultation with E. G. Misner, Professor of Farm Management at Cornell University, who assisted in preparing a modification of former report blanks adapted especially to the work proposed. Mr. C. P. Clark, who had had considerable experience in supervising investigations of cost accounts and statistical work, was made supervisor of the entire investigation of the cost of milk production.

It is believed consequently that the methods of obtaining the information, and the personnel of the investigating staff, was as reliable as it was possible to obtain for such a survey as this. During the period of nine weeks when the men were in the field, they visited every dairy district from which Rochester obtains its milk supply. The number of districts visited and the number of dairy farms in each are shown in the table below:

District.	Number of Farms.
Bliss	24
Wayne and Livingston Counties.....	33
Monroe County	84
Total.....	141

The general summary of the information obtained from these farms is given in Table No. 23:

TABLE No. 23
GENERAL DATA FROM 141 FARMS

Number of farms.....	141
Number of cows	2,314
Total milk produced (pounds).....	14,654,115
Total milk sold wholesale (pounds).....	14,060,306
Total milk sold wholesale (quarts).....	6,539,677
Percent of Rochester supply furnished by 141 farms.....	21%
(Based on average consumption of 85,000 quarts per day.)	
Total expenses	\$659,958.06
Returns other than wholesale milk.....	69,911.36
Net costs	\$590,046.70
Total receipts for wholesale milk.....	471,729.10
Total loss	\$118,317.60
Acres per farm	131
Value per acre	\$158
Acres of pasture per farm.....	28
Value of pasture per acre.....	\$73
Average number of cows.....	16.4
Value of cows per head.....	\$126
Production per cow (pounds).....	6,333

It is believed that the location of the farms was such that they fairly represent the character of the farms supplying milk to the City of Rochester. Information obtained from the milk distributors and from the Department of Health indicate that the number of dairy farms supplying Rochester milk varies from 700 to 800. The best figure obtainable by this survey is 778 dairy farms.

The 141 farms from which cost accounts were obtained are believed to be a sufficient number to furnish accurately figures showing the cost of producing milk on the entire list of farms, because they were not

only located in every dairy district, but represented every type of dairy farm, large and small. The farms were not selected, but were taken just as they came on the roads on which the inspectors traveled.

The cost of milk production on all of the farms has been compiled, and the figures added together to show the cost of producing milk per 100 pounds and per quart. This summary is given in Table No. 24:

TABLE No. 24
SUMMARY OF COSTS OF PRODUCTION ON 141 FARMS
May 1, 1918, to May 1, 1919

	Per Cwt.	Per Qt.
Depreciation on cows.....	.0756	.00163
Interest on cows at 6%.....	.1241	.00267
Grain and other concentrates.....	1.0721	.02305
Succulent feed	.6805	.01463
Hay and other dry forage.....	.6048	.01300
Total feed except pasture.....	2.3574	.05068
Interest on feed and supplies at 6%.....	.0417	.00090
Pasture	.2424	.00521
Bedding	.1651	.00355
Human labor	1.2116	.02605
Horse labor	.0975	.00210
Use of buildings	.1422	.00306
Use of equipment	.0791	.00170
Bull service	.0351	.00075
Miscellaneous costs	.1219	.00262
Total cost	4.6937	.10092
Returns except wholesale milk.....	.4972	.01069
Net cost (difference).....	4.1965	.09023
Price received	3.3550	.07214
LOSS	.8415	.01809

The significance of Table No. 24 is that the actual cost on all of the 141 farms visited for producing 100 pounds of milk was \$4.19, or \$.09 per quart. The price received for this milk during the year was only \$3.35 per 100 pounds, or \$.072 per quart, showing a net loss to these 141 milk producers of \$.84 per 100 pounds, or \$.018 per quart.

The figures in this summary are obtained from the details in the report blanks and can be best understood by arranging these details in a number of ways, indicated by the tabulations which follow. In Table No. 25 is shown the total quantity of feed and of labor required by each cow per year, and per 100 pounds of milk:

TABLE No. 25
QUANTITY OF FEED AND LABOR REQUIRED

	Per Cow.	Per Cwt. of Milk.
Grain and other concentrates.....	2,635 lbs.	41.6 lbs.
Succulent feed	10,493 lbs.	165.7 lbs.
Hay and other dry forage	3,769 lbs.	59.5 lbs.
Human labor	211 hrs.	3.33 hrs.

The number of cows on the farms, their value at the beginning of the year, May 1st, 1918, and the number of cows purchased, the heifers that became cows, and the value at the end of the year are shown in Table No. 26:

TABLE No. 26
INVENTORIES, PURCHASES AND SALES OF COWS
BEGINNING OF YEAR

	Number	Price	Total Value
Cows on hand May 1, 1918.....	2,282	\$123.21	\$281,160
Cows purchased	673	120.05	80,792
Heifers that became cows.....	124	101.98	12,645
Total.....			\$374,597

END OF YEAR

	Number	Price	Total Value
Cows on hand May 1, 1919.....	2,306	\$130.21	\$300,275
Cows sold	737	86.06	63,427
Cows died	34		
Cow hides	22	11.84	260.50
Total.....			\$363,962.50

Value at beginning of year, plus purchases, plus heifers that became cows \$374,597.00
Value at end of year, plus sales..... 363,962.50

Depreciation (difference) \$ 10,634.50

Average inventory of cows—Number..... 2,314
Average inventory of cows—Total value..... \$290,841.00
Value per head 125.69

From these figures it appears that the depreciation was \$10,634.50 on all the farms for the year covered by the inquiry. This depreciation is the amount of money required for replacement, or to make up for losses through the sale or death of animals, and the cost of keeping the herds up to their full production. The inventory showed an average of 2,314 cows, and the value placed on these animals by the owners was \$290,841.00, or \$125.69 per head. These figures differ from the total value at the beginning and at the end of the year because of the shifting of cows during the year, and because of the buying of fresh cows and the selling of dry ones.

From a business standpoint it is of some interest to know the amount of money invested in land and buildings on these farms. The number of acres used for dairy purposes cannot be accurately separated from the total number of acres in the farms, therefore, the total acres in these farms is the figure given. The investment in land and buildings is shown in Table No. 27:

TABLE No. 27
INVESTMENT IN LAND, BUILDINGS, ETC.

Acres in farms.....	18,515.5
Average value per acre.....	\$158
Total value of farms.....	\$2,926,828
Acres of pasture.....	3,490.5
Value of pasture per acre.....	\$73
Total value of pasture.....	\$254,025
Acres of pasture rented in addition to the above.....	470
Value of buildings used by cattle.....	\$290,058
Value of equipment used by cows.....	41,956.23
Value of average feed and supplies on hand for cows..	97,652

The totals of the amount of grain and other concentrates fed are shown in Table No. 28:

TABLE No. 28
GRAIN AND OTHER CONCENTRATES

	Per Cent. of Total Amount.	Pounds.	Price Per Ton.	Total Value.
Home grown grain.....	19%	1,176,094	\$48.02	\$28,240.06
Wet brewers' grain (reduced to dry basis)	17%	1,024,159	24.65	12,623.80
Other purchased grains.....	64%	3,898,253	56.38	109,883.15
Total.....		6,098,506	\$49.44	\$150,747.01

It is important to note that 19% of the grain used was home grown. The price per ton on the home grown grain was based on the market price of such grains, less the cost of marketing. The wet brewers' grains were used to an unusual extent on some of these farms. The quantity was reduced to a dry basis in order that the amount and price might be fairly compared with the other grains fed. The low cost per ton of these brewers' grains is offset to a considerable extent by the increased cost of hauling over the cost of hauling other purchased grains. In reducing the wet grains to dry grains, the basis used was 65 lbs. of wet grains per bushel, and $\frac{1}{4}$ lb. of dry matter to each lb. of wet grains.

The estimates obtained for succulent feeds, hay and other dry forage, were based on the quantities used according to the best recollections of the producers, and on the prices per ton at which these products are commonly rated. The figures for succulent feed are given in Table No. 29, and for hay and other dry forage in Table No. 30:

TABLE No. 29
SUCCULENT FEED

	Per Cent. of Total Amount.	Tons.	Price Per Ton.	Total Value.
Corn silage	83%	10,066	\$8.11	\$81,596.00
Soiling crops, roots, etc.....	17%	2,074	6.79	14,077.00
Total.....		12,140	\$7.88	\$95,673.00

TABLE No. 30
HAY AND OTHER DRY FORAGE

	Per Cent. of Total Amount.	Tons.	Price Per Ton.	Total Value.
Hay and Alfalfa.....	76%	3,328	\$22.78	\$75,803.68
Corn Stover	17%	741	8.88	6,578.50
Straw, Bean Pods, etc.....	7%	292	9.08	2,650.50
Total.....		4,361	\$19.50	\$85,032.68

The labor of the operator or owner and other unpaid labor is charged on the basis of the estimates furnished by the operators. The figures for paid labor are made up from the actual wages paid plus the cost of board, and the number of hours the labor was employed. The rates per hour, when one considers the wages paid in other lines of industry, are certainly not too high. As a matter of fact, the average loss sustained of \$.8415 per 100 pounds subtracted from the total labor charge of \$1.2116 in Table No. 24 shows that all the labor actually received after paying all other costs was only \$.11 per hour for their labor instead of \$.349 as charged in Table No. 31:

TABLE No. 31
HUMAN LABOR

	Per Cent. of Total Labor.	Hours.	Rate Per Hour.	Total Value.
Operator	51%	246,909	\$.416	\$102,606.44
Other unpaid labor.....	13%	65,443	.280	18,338.03
Paid labor	36%	176,134	.281	49,413.52
Total.....		488,486	\$.349	\$170,357.99

The total value of the operators' labor, as shown in Table No. 9, was \$102,606.44. The value of the other unpaid labor was \$18,338.03, making a total for unpaid labor of \$120,944.47. The total losses as shown in Table No. 23, were \$118,317.60. This assumes that all labor was paid. If the unpaid labor amounting to \$120,944.47 was not included in the expenses, it would leave to the farmer a profit of \$2,626.87 to apply to the wages of the unpaid labor. The number of hours the unpaid labor was employed was 312,352, as shown in Table No. 31. If only \$2,626.87 was available to pay for this, the unpaid labor actually received \$.0084 per

hour, or less than 1c per hour. If the labor of the farmer's wife and children was not charged for, and all of the \$2,626.87 above other expenses, including paid labor, remained for the operators themselves, each operator would have received \$.0106 per hour for his own labor.

TABLE No. 32
RETURNS EXCEPT MILK SOLD WHOLESALE

	Amount.	Price.	Value.
Appreciation on Cows.....			
Milk used by Families.....	160,223 qts.	\$.071	\$11,374.82
Milk Retailed, used for butter and fed to stock	118,869 qts.	.070	8,268.43
Manure recovered	20,612 tons	1.77	36,429.00
Feed bags			627.00
Calves born (value at birth).....	1,831	7.22	13,211.75
Total.....			\$69,911.00

Table No. 32 shows the receipts from other sources than milk. If there were appreciation or increased value in cows it would appear in this list of items. It is set down as one of the items, but no figures are placed opposite this item, for the reason that there was no appreciation on the farms as a whole.

The milk used by the farmers' families is charged for at the average League price for the year. The slight difference between this figure and the figure actually received, as shown in Table No. 24, is more than made up by the cost of hauling milk to the shipping station for the milk which was shipped from the farm. Some small quantities of milk were retailed by farmers themselves, and these amounts are included in the receipts.

The producing territory was divided into three regions because the character of the farms seemed to indicate a natural division of this kind.

The more important points of difference between the character of the farms in these regions is shown in Table No. 33.

TABLE No. 33
COMPARISON OF CONDITIONS IN THREE DAIRY DISTRICTS

Region.	Farms Visited	Dairy Cows Per Farm.	Acres of Land.	Value Per Acre.	Acres of Pasture.	Value Acre.
Bliss, N. Y.	24	15.8	180.3	\$ 54.00	60	\$32.00
Wayne and Livingston Counties	33	22	179.2	134.00	33	86.00
Monroe County	84	14.3	98.5	197.00	17	109.00

The farms located in the Bliss regions are for the most part devoted to milk production, having comparatively small sources of income outside of the income from milk. The farms in Monroe County are many of them engaged in the production of apples and other fruit as well as general farm crops and are located near enough to the City of Rochester to make it convenient to haul considerable quantities of wet brewers'

grains from Rochester to the farm. The differences in the cost of producing milk in these three regions are shown in Table No. 34, and in Tables Nos. 35 and 36 are shown the quantities of feed and labor per cow and per 100 pounds of milk in each of these three regions.

TABLE No. 34
COMPARISON OF COSTS OF PRODUCTION BY REGIONS

	Bliss. 24	Wayne and Livingston Counties. 33	Monroe County. 84
Number of Farms.....			
<i>Summary of Costs Per Cwt. of Milk:</i>			
Depreciation on Cows.....	\$.0785	\$.0715	\$.0772
Interest on Cows at 6%.....	.1806	.1247	.1135
Grain and other Concentrates.....	1.2054	.8919	1.1411
Succulent Feed	.4143	.7295	.7040
Hay and other Dry Forage.....	1.0608	.5383	.5553
Total Feed except Pasture.....	\$2.6805	\$2.1597	\$2.4004
Interest on Feed and Supplies at 6%.	.0424	.0439	.0404
Pasture	.3207	.2395	.2295
Bedding.....	.1165	.1576	.1780
Human Labor	1.5391	1.0624	1.2287
Horse Labor	.1471	.0684	.1034
Use of Buildings	.1589	.1207	.1503
Use of Equipment	.0713	.0710	.0847
Bull Service	.0907	.0367	.0241
Miscellaneous Costs	.1331	.0943	.1342
Total Cost	5.5594	4.2504	4.7644
Returns except Wholesale Milk, per cwt..	.6799	.4561	.4849
Net Cost (Difference).....	4.8795	3.7943	4.2795
Price received per Cwt. Milk.....	2.9093	3.3963	3.4157
Loss per Cwt. Milk.....	1.9702	.3980	.8638
Production per Cow (pounds).....	4334	6053	7133

TABLE No. 35
QUANTITIES OF FEED AND LABOR PER COW

	Bliss.	Wayne and Livingston Counties.	Monroe County.
Grain and other concentrates.....	1,833 lbs.	1,867 lbs.	3,356 lbs.
Succulent Feed	4,673 lbs.	11,949 lbs.	11,441 lbs.
Hay and other Dry Forage.....	4,707 lbs.	3,346 lbs.	3,731 lbs.
Human Labor	178 hrs.	183 hrs.	239 hrs.

TABLE No. 36
QUANTITIES OF FEED AND LABOR PER 100 LBS. MILK

	Bliss.	Wayne and Livingston Counties.	Monroe County.
Grain and other concentrates.....	42.3 lbs.	30.8 lbs.	47.0 lbs.
Succulent Feed	107.8 lbs.	197.4 lbs.	160.4 lbs.
Hay and other dry forage.....	108.6 lbs.	55.3 lbs.	52.3 lbs.
Human Labor	4.10 hrs.	3.03 hrs.	3.35 hrs.

It has often been pointed out in the past that large producing cows produce milk more cheaply than small producing cows.

It was recognized that one of the most important branches of the study of milk production should aim to bring out this difference. Therefore, all of the farms have been classified according to the volume of milk which they produced per cow each year, from less than 4,000 lbs. per cow to more than 9,000 pounds per year. Their average production, the number of farms in each group, the average number of cows per farm and the cost of production per 100 pounds and per quart of milk, are all shown in Table No. 37:

TABLE No. 37

EFFECT OF PRODUCTION PER COW ON COST OF PRODUCTION

Group.	PRODUCTION PER COW—		No. of Farms.	No. of Cows Per Farm.	COST OF PRODUCTION	
	Average Pounds.				Per Cwt.	Per Qt.
4000 or under.....	2841	9	17.8	\$7.103		\$0.1527
4001 - 5000.....	4674	16	18.4	4.884		.1050
5001 - 6000.....	5446	27	17.9	4.365		.0939
6001 - 7000.....	6472	39	16.3	4.024		.0865
7001 - 8000.....	7487	23	14.6	4.011		.0862
8001 - 9000.....	8326	15	17.3	3.715		.0799
Over 9000	9751	12	12.1	3.898		.0838

It is obvious, that as in past investigations of this kind, the small producing cows produce milk at a much greater expense than the large producing cows. Thus, in the last column, it is to be noted that farms having cows producing an average of less than 4,000 pounds per year, produce milk at a cost of more than 15 cents per quart, while farms having cows producing an average between 8,000 and 9,000 pounds a year, produce milk at a cost of about 8 cents. Cows producing over 9,000 pounds per year, apparently produce milk at a slightly higher cost than cows between 8,000 and 9,000 pounds. This irregularity is a circumstance which may be due to unusual irregularity in costs, or to the fact that there were too few farms in the last group.

In Table No. 38 is shown the relation of the production per cow to the hours of human labor and to the cost of labor:

TABLE No. 38

RELATION OF PRODUCTION PER COW TO LABOR

Production Per Cow.	HOURS OF HUMAN LABOR		Rate Charged.	Rate Received.
	Per Cow	Per 100 Lbs. Milk.		
4000 or under.....	170	6.0	\$0.363	— \$0.291
4001 - 5000.....	192	4.1	.361	— .035
5001 - 6000.....	196	3.6	.347	+ .085
6001 - 7000.....	213	3.3	.330	+ .137
7001 - 8000.....	233	3.1	.349	+ .152
8001 - 9000.....	221	2.6	.353	+ .253
Over 9000.....	266	2.7	.387	+ .232

In Table No. 38 it is to be noted that the number of hours of human labor per cow increases gradually with the increase in the volume of milk produced. This is because of the length of time required to milk large producing cows, and because the feeding and other services require more time for large producing cows than for small producing cows. The use of brewers' grains on the farms with larger producing cows required more time for the hauling of grain. On the other hand, when these hours of labor are compared with the quantity of milk produced, the opposite condition is true. It is seen from Column No. 3 that the hours of labor per 100 pounds of milk are very much larger with small producing cows than the hours of labor per 100 pounds of milk for the large producing cows. In short, less labor is required in connection with the production of the same quantity of milk from large producing cows than small producing cows.

In the last two columns it will be noticed that the rate charged for the human labor was nearly the same for all cows; but that the rate received increased from a loss of 29 cents per hour to a maximum gain of 25.3 cents. While this did not pay the cost of the labor, yet the last column shows that the increase in the volume of milk produced per cow brought in a much larger labor income.

The quantity of feed required to produce 100 pounds of milk is shown for each of the same groups of farms producing from less than 4,000 to over 9,000 pounds per cow annually, in Table No. 39:

TABLE No. 39
RELATION OF PRODUCTION PER COW TO FEEDING

Production Per Cow.	POUNDS OF GRAIN		POUNDS SUCCULENT FEED		POUNDS DRY FORAGE	
	Per Cow.	Per 100 lbs. Milk.	Per Cow.	Per 100 lbs. Milk.	Per Cow.	Per 100 lbs. Milk.
4000 or under	1381	48.6	5194	182.8	4738	166.8
4001 - 5000	1661	35.5	7087	151.6	4752	101.7
5001 - 6000	2023	37.1	11285	207.2	3199	58.7
6001 - 7000	2480	38.3	11263	174.0	3410	52.7
7001 - 8000	3250	43.6	10657	143.1	4074	54.7
8001 - 9000	4342	52.1	12880	154.7	3548	42.6
9001 and over	4245	43.5	12578	129.0	3874	39.7

Table No. 39 shows clearly that while the pounds of grain per cow increases with increased production, the pounds of grain per 100 pounds of milk are approximately the same. The pounds of succulent feed also increase gradually with the production per cow; but decrease per 100 pounds of milk produced. The pounds of dry forage per cow diminish with an increase in production and also to a much larger extent diminish per 100 pounds of milk. The number of cows in each of these groups and the quantity of milk produced by them as well as the percentage of the total milk sold to the City of Rochester in each group is shown in Table No. 40:

TABLE No. 40

PRODUCTION PER COW AND THE TOTAL MILK SUPPLY

Production Per Cow.	Number of Cows in Group.	Total Number of Cows.	Milk Sold Wholesale.	Per Cent. of Total Milk Sold.
4000 or under.....	160	6.9%	419,182 Qts.	3.0%
4001 - 5000.....	294	12.7%	1,306,895 Qts.	9.3%
5001 - 6000.....	483	20.9%	2,509,025 Qts.	17.8%
6001 - 7000.....	637	27.5%	3,967,796 Qts.	28.2%
7001 - 8000.....	336	14.5%	2,417,615 Qts.	17.2%
8001 - 9000.....	259	11.2%	2,070,025 Qts.	14.7%
Over 9000	145	6.3%	1,369,768 Qts.	9.7%

From Table No. 40 it appears that 28.2 per cent. of all the milk supply of Rochester is furnished by cows producing between 6,000 and 7,000 pounds of milk yearly and that this is the largest group both in respect to farms and in respect to cows producing milk for Rochester.

One of the influences which is a most important factor in the cost of milk production and which has not received the recognition that it deserves, is the number of cows in a dairy herd. The volume of milk produced by each cow has been given an immense amount of study by dairy colleges and dairy farmers. On the other hand, it has been commonly assumed that cows of small production would be unprofitable, regardless of the number of such animals in a dairy herd. It must be recognized that the "boarder" cows, or cows producing less milk than will pay their expense, are always a loss. On the other hand, the number of cows in a herd, by increasing the volume of milk produced, reduce to a great extent the cost of the milk, correspondingly reduces the loss on such boarder cows. The effect of the number of cows on the cost of production is shown in Table No. 41:

TABLE No. 41

EFFECT OF NUMBER OF COWS ON COST OF PRODUCTION

NUMBER OF COWS.		Number of Farms.	Production Per Cow.	COST OF PRODUCTION.	
Group.	Average.			Per Cwt.	Per Qt.
Under 10.	7.7	24	6,635	\$5.22	\$0.112
10 - 14	11.9	44	6,846	4.41	.095
15 - 19	16.1	36	6,507	4.14	.089
20 - 29	22.6	27	6,080	4.20	.090
30 or over	41.6	10	5,682	3.47	.075

From the above table it appears that there were 24 dairy farms having herds averaging 7.7 cows, and that these individual cows produced an average of 6,635 pounds per year at a cost of \$5.22 per 100 pounds or 11.2 cents per quart. Contrasted with this, on 10 farms averaging 41.6 cows, producing only 5,882 pounds each, the cost of milk production was only \$3.47 per 100 pounds, or 7.5 cents per quart.

The effect of the number of cows on labor, buildings and equipment cost is shown in Table No. 42:

TABLE No. 42
EFFECT OF NUMBER OF COWS ON LABOR, BUILDING AND
EQUIPMENT COSTS

Number of Cows.	HUMAN LABOR				Building Cost Per Cow.	Equipment Cost Per Cow.
	Hours. Per Cow.	Hours Per Cwt. Milk.	Rate Charged.	Rate Received Per Hour.		
Under 10	276	4.16	.368	—,067	\$14.68	\$5.10
10 - 14	246	3.60	.359	—,074	10.15	6.19
15 - 19	217	3.33	.362	—,139	9.70	4.60
20 - 29	194	3.19	.336	—,080	7.61	4.79
30 or over	155	2.72	.310	—,293	4.09	3.23

From Table No. 42 it is clear that the number of hours of labor per cow is greatly diminished by increasing the number of cows in a herd, thus reducing the labor cost. The number of hours of labor per 100 pounds of milk is also diminished to a marked degree with an increase in the number of cows per herd. While the receipts for labor per hour are greatly increased, the cost of buildings per cow and the cost of equipment per cow are greatly diminished by an increase in the number of cows. This simply means that increase in the volume of business resulting from large herds reduces all of the costs.

The number of cows contained in each of the herds of different sizes and their percentage of the total, the quantity of milk produced by the herds of different sizes and its percentage of the total, are shown in Table No. 43:

TABLE No. 43
NUMBER OF COWS AND TOTAL MILK SUPPLY

Number of Cows.	Number of Cows in Group.	Per Cent. of Total Number of Cows.	Total Milk Sold Wholesale.	Per Cent. Total Wholesale Milk.
Under 10	184	8%	1,130,058 lbs.	8%
10 - 14....	524	23%	3,417,332 lbs.	24%
15 - 19....	579	25%	3,632,938 lbs.	26%
20 - 29....	611	26%	3,581,400 lbs.	26%
30 or over	416	18%	2,298,578 lbs.	16%

A review of the figures shown in Tables Nos. 37, 40 and 41 indicates that if the dairy herds averaging less than 5,000 pounds of milk per cow were eliminated, it would eliminate 12.3 per cent. of the supply and milk which now costs from 10 to 15 cents per quart to produce. If all herds with less than 10 cows were eliminated, it would remove 8 per cent. of the supply and milk now costing 11.2 cents per quart to produce.

HEARINGS ON THE COST OF PRODUCTION

In determining the cost of production for Rochester one branch of the investigation had to do with the securing of information from witnesses regarding the cost of production on dairy farms operated by them.

These witnesses were dairy farmers producing milk for the City of Rochester, who were selected by the local officers of the producers' organization, known as the Dairymen's League. The object in permitting the Dairymen's League to select their own witnesses was in order that they might present their own case to the Survey in their own manner and from their own point of view. The possibility of their purposely choosing witnesses who would testify to costs higher than the average cost of Rochester producers was fully recognized. For this reason the director of the Survey was prepared to receive these costs only on the basis of the producers' own selection, with the understanding that so far as the Survey was concerned its main dependence would be placed upon producers' costs secured through the Survey's own investigators.

This testimony of these witnesses in so far as it referred to special cost items and the total cost of producing milk on their farms, is given in part below. This testimony is not given in full as much of it had to do with discussions not directly concerned with cost items. Portions of the testimony which are abstracted were the portions of greatest importance to the Survey.

FREEMAN GILMORE, produced as a witness on behalf of the Dairymen's League, first being duly sworn, examined by Mr. Fuller, testified:

Q. You live where?

A. I live in the Town of York.

Q. And what is your business?

A. Farming.

Q. And how many cows do you keep?

A. From 45 to 50.

Q. And your milk is sold where?

A. In Rochester.

Q. And it is shipped in, is it?

A. Yes, sir.

Q. You made some figures as to the cost of production, have you not?

A. Yes, sir.

Q. How large is your farm?

A. 433 acres. I might state right here that the farm is divided by a highway, and that the dairy barns are on one side by themselves, and our dwelling house and horse barns, etc., are on the other side of the road.

Q. How much do the oats total?

A. \$312.50.

Q. Cotton seed meal?

A. \$61.80. Now, then there was 12,024 pounds there, \$211.01, that was not bought in car load lots but at a local mill, but the price was

the wholesale price. And then I bought a bran substitute, 27,760 pounds at \$33.00, total \$459.04. Then we bought 25,700 pounds of oil meal at \$51.50 and that came to \$663.93. Might add we hauled the above feed, \$78.00. Now, then, I fed in hay, the following: 75 tons at \$18.00, \$1,350.00, and there was 288 tons of ensilage, which I estimated at its feeding value, \$6.00, \$1,628.00; and then 30 tons of straw at \$5.00, \$150.00. Now then, the total hours of labor spent on the cows; one man I paid \$60.00 a month and boarded him, and I put it in at \$900.00. There is another man I paid \$780.00, and one man milked mornings, \$109.50. Now, then, I had another charge of a man, \$600.00, I have had every morning to see that the milk is properly cooled and looked after. There is a rent of land for pasture purposes; I estimate that it would take 3 acres for a cow, \$15.00 an acre, makes a total of \$700.00. I have averaged taxes on the entire farm and I figured, I think, \$1.13 an acre, and that is \$158.20.

Q. That is charged to the cattle?

A. Yes. Now, then, in the use of the dairy buildings; there is 3 silos and the dairy house, cattle barn, hay and grain barn, and an ice house, and a shed for sawdust. I estimate the value of that at \$10,000.00, about 6 per cent. interest on it, \$600.00, and a depreciation of 4 per cent., \$400.00. The insurance on it for 3 years is \$165.00; that makes an average of \$55.00 a year. I have a list here of equipment: 57 eight gallon cans; 4 five gallon cans; 8 pails, \$1.25, \$10.00; milk wagons, \$110.00; 3 shovels, \$1.75 each, \$5.25; 1 shovel at \$1.00; 3 brooms, etc. I put the total depreciation on that at \$201.33.

Q. What did you put the total value?

A. \$604.00. Then I had an investment in cows of 48 cows at \$150.00 each, figures \$7,200.00; the interest on them at 6 per cent. is \$432.00 and the depreciation less the salvage is \$1,152; and one bull at \$150.00, and charged interest on him at \$9.00; on the water supply, which consists of tile and pipe lines and derrick and wind-mill, gas engine, engine house, hydrants, etc. I estimated the cost of and placed them at \$1,700.00, and the interest at \$102.00; depreciation at 7 per cent., \$112.00; gasoline, 55 gallons at 15¼. There is a slight discrepancy on that because I estimated that about 70 per cent. of the water supply went to the barn; as a matter of fact, I think 90 per cent. of that went to the cow barn; it did not alter the figures materially, but I have not seen these figures until this afternoon, going over them a second time; but the water supply for the entire farm, I figured it at 70 per cent; I think that is a low estimate. Now, under miscellaneous, there was, insurance on cows, \$2,000.00, \$12.00; salt, \$18.00; lanterns, 6 lanterns, \$7.50; hot water heater, \$15.00; I figured the interest and depreciation at \$4.40; 7

cords wood, \$56.00; \$9.30 for cleanser powder, and fly spray, \$10.00, and lime \$10.50, and the cooling tank and drinking trough, \$85.00, 10 per cent., \$8.50; sawdust, \$65.00; depreciation, \$20.00; 31½ tons of ice, \$118.13; freight on ice, \$45.33; hauling ice, \$42.00; total, \$404.94.

Q. Your next item is for your windmill and tank, etc.?

A. Yes.

Q. And you figure your interest and depreciation on that at \$160.00?

A. 70 per cent. on the water supply would make that \$160.00.

Q. And that makes a total expenditure of how much?

A. \$12,305.48.

Q. Now, your credit on here is what?

A. 420 tons of manure at \$1.00 a ton, \$420.00; and 43 calves at \$7.00, \$301.00.

Q. And you produced how many pounds of milk?

A. 279,078 pounds.

Q. And that is approximately 5,600 pounds per cow?

A. Approximately.

Q. How much do you figure your milk cost you?

A. Four dollars and a fraction.

Q. Around \$4.30?

A. Around there.

Q. Have you calculated anything for your own service?

A. Yes.

Q. How much?

A. \$600.00. I figure my time is worth more than that.

Q. About how much would that be an hour?

A. I cannot tell you how much.

Q. Would it be thirty cents an hour?

A. For a year?

Q. Yes, on an average right straight through?

A. About two dollars a day, would it not?

Q. About a ten-hour day?

A. I ought to be worth two dollars a day, I think.

PHELPS HOPKINS, produced as a witness, first being duly sworn, examined by Mr. Fuller, testified:

Q. Mr. Hopkins, you reside where?

A. Pittsford.

Q. What is your business?

A. Farmer.

Q. And you have been engaged in that business all your life?

A. Why, no, I lived on a farm all my life.

Q. Will you describe your farm?

A. 220 acres, general farming; about 35 acres of woodland; about eight acres pasture, and the rest of the farm is used in growing wheat, silage, corn, some potatoes, oats and some barley, and last year I averaged thirty-two cows.

Q. About what is the value of your farm, Mr. Hopkins, per acre?

A. About \$200.00.

Q. And that is located how far from Rochester?

A. Five miles and a half from the city line, Cobb's Hill.

Q. You ship your milk into Rochester how?

A. By trucks, automobile trucks.

Q. You have kept some accounts as to the cost of the production of milk, have you?

A. Yes.

Q. And you have brought here in court your books showing your accounting system?

A. Yes.

Q. Will you describe how you kept those accounts?

A. Yes. At the first of the year all the books start, March 15, 1918.

Q. Your fiscal year ends the 15th of March.

A. Yes. We take an inventory of everything on the farm at the beginning of the year, including everything on the farm, horses, cattle, equipment; all equipment is listed in detail; the same with individual animals; all food on hand, hay, straw, silage, are all inventoried at their either appraised value or what they are worth on the market.

Q. Are you a Cornell man?

A. Yes.

Q. What course?

A. Two years special course.

Q. And you may also state the method in which you keep your accounts during the year?

A. Yes, I will. A separate book; two different books are used, a ledger and labor book. The ledger is composed of different industries on the farm, such as crops and cattle and a lot of smaller industries, pumping water, etc. The labor book is composed of the same industries practically and the labor each day is written up; how much time is spent on labor, man hours and horse hours. Also, a chore sheet is kept, which is time spent on the chores. Then at the end of the next year, the books are closed once a year, labor is computed by hours, the cost per hour; the total charge against labor, including board as well as the cash and rent of tenant house, and all those things enter into it and a charge of

labor against it and labor is computed, cost per hour and charged to various enterprises. The same way with horse labor and then the inventories are balanced up and a new set of books started. That is in general the practice of the books.

Q. And you start in again after the end of the fiscal year?

A. Yes.

Q. Now, have you made for me computations in reference to the production of milk?

A. I have.

Q. And you say, your year begins and ends on the 15th of March?

A. Yes.

Q. Your computation then runs on quantities from the 15th of March, 1918, to the 15th of March, 1919?

A. Yes.

Q. What was your total cost?

A. \$8,961.51.

Q. What were your total credits?

A. \$7,936.26.

Q. And what was your net cost of milk?

A. \$4.20 per hundred.

Q. That was your cost?

A. That is not last year's figures; those are present prices.

Q. I mean, present prices, what was it?

A. \$4.20.

Q. How many pounds of milk did you produce?

A. 188,960.

IX

COST OF COUNTRY HAULING

Each day a large amount of labor on the part of dairy farmers and horses is expended in hauling milk from the farms to the point of shipment. For the purpose of securing information as to the number of men and horses employed in this work, and the points from which milk is shipped, a form of questionnaire was prepared and mailed to all of the 778 dairy farms producing milk for Rochester. Replies were received by mail from 276 producers, from which the following information was obtained:

Number of producers	276	
Producers' own wagon to railroad platform.....	163	
Producers' own wagon to Rochester.....	10	
By truck with other farmers to railroad platform.....	6	
By truck with other farmers to Rochester.....	64	
By dealers' truck to Rochester.....	13	
Shipping to Rochester by rail.....	119	
Shipping to Rochester by trolley.....	68	
Amount of milk produced daily.....	35,565	Qts.
Amount of milk received from producers' own wagon to railroad platform	22,799	"
Amount of milk received by producers' own wagon to Rochester.....	1,492	"
Amount of milk received by truck with other producers to railroad platform	767	"
Amount of milk received by truck with other producers to Rochester..	7,313	"
Amount of milk received by dealers' trucks to Rochester.....	1,630	"
Amount of milk received by railroad to Rochester.....	17,420	"
Amount of milk received by trolley to Rochester.....	7,710	"
Amount of milk delivered by producers living on trolley line (18 men)	1,564	"

Although all of the 778 producers did not reply to the questionnaire, the replies received from 276 of them were from every dairy district, and it is believed that these replies were sufficient in number and sufficiently well distributed to furnish a fair estimate as to the labor performed in the handling of milk from the dairy farms to the point of shipment. It will be noted from the table that 163 producers hauled milk in their own wagons to the railroad platform, either the steam railroad or the trolley railroad, while 10 producers hauled milk from their farms directly into the City of Rochester, and 6 producers hauled milk to the railroad platform with other farmers. The number of trucks hauling milk to Rochester owned by farmers or owned by dealers was not obtained. It is therefore not possible to form an estimate as to whether these trucks were fully loaded, or whether they represented less than a full load. If we give attention especially to the hauling of milk on the country end of the line by the farmers themselves from the reports of the inspectors, it is estimated that the average distance traveled by each farmer is 2 miles, and that the length of time required for taking milk out of his milk house, loading it onto his wagon, hitching up his horse,

driving to the shipping point, delivering his milk, securing his empty cans, returning to the farm and unhitching his horse, is a total of $1\frac{1}{2}$ hours. This estimate would apply to the 163 farmers hauling milk in their own wagons to the railroad platform. It would also apply to the 10 farmers hauling milk directly to Rochester, if we eliminate the length of time spent in hauling milk within the city limits. It is fair to assume of the 6 farmers hauling milk jointly not more than 3 wagons would be employed, and therefore only 3 of these farmers would be engaged at one time. This would make a total of 176 farmers out of the 276 from whom reports were received who were engaged daily in hauling milk from their farms to the shipping point.

The value of labor per man hour is estimated at \$.349, and horse labor \$.194, which are the average rates on the 141 farms on which cost of production records were obtained. This makes \$.543 per hour for 1 man and 1 horse. For $1\frac{1}{2}$ hours the cost is \$.814. If we multiply this by 176 farmers, the daily cost is \$143.26 under the present system of hauling. If we assume that the same proportion of farmers are hauling milk in the entire list as in the list reporting, it would mean that, out of the total 778 farmers, there are 496 who haul their own milk, and if we apply the same costs, the daily cost is \$403.74.

It is recognized that from a business standpoint the most economical system of hauling is a co-operative system. Under this arrangement large trucks travel on the main roads capable of carrying not less than 30 cans each, and some of them carry much larger loads than this. The dairy farmers living on side roads, or whose houses are located on lane-ways back from the main road, find it necessary to hitch up a horse and carry the milk by wagon to the main road. The farmers living directly on the main road may carry their cans by hand to the platform. Such a system as this has been adopted on a large scale by many dairy districts.

It is estimated that a fair allowance for the average time required to take milk out of the milk house and carry it to the main road and return with empty cans would be one-half hour to each farmer. If we use the same cost for man and horse, this would amount to \$.271 per half hour. Applying this to the 176 farmers reported as hauling milk would make their daily costs for carrying milk from the milk house to the main road, \$47.75. Applying the same figure to the total number of farmers estimated hauling, which is 496, would make the daily cost of carrying milk to the main road \$134.56.

The cost of trucking on the main road in the dairy districts where this is performed is charged for at the rate of $\frac{1}{4}$ c per quart of milk. Applying this charge to the milk handled by the 176 farmers reporting would make the daily cost of trucking on the main road \$62.64. If we

assume that the same proportion of milk was carried by the 496 farmers estimated as hauling, the daily cost of trucking on the main road for their milk would be \$176.53. This would make the total cost under a co-operative system for the 276 farmers reporting \$110.39, and for the 496 estimated as hauling, \$311.09, showing a total daily saving over the present individual system for the 176 farmers reporting of \$32.87, or \$11,997.55 yearly.

The savings under the trucking system for the 496 farmers estimated as hauling would be daily \$92.65, or yearly \$33,817.25.

It is recognized that these figures are only estimates and therefore not necessarily a close statement of what actually could be done under the co-operative system. It is also recognized that the geography of the dairy districts will determine to a large extent whether a co-operative trucking system on main roads can be installed to advantage. It is a fact, however, that in every dairy district there are main roads reaching from the remotest farm to the point of shipment, and there are but few of them where it would not be possible for a wagon starting from the remotest point to pick up milk from side roads and from lane-ways so that by the time it reached the shipping point it would be carrying a full load. On the return journey this same wagon can leave at the entrance of the side roads and lane-ways the empty cans which it received from the shipping point.

Every investigation made of the business of country hauling has shown that in most dairy districts there are excessive numbers of wagons and horses being used by the dairy farmers for this purpose, the cost of which must be charged by them in the price demanded for milk. Here seems to be one of the branches of the producers' business which would lend itself to a decided economy if, through a local committee, the territory could be districted and a trucking system established which would provide for full loads rather than the small number of cans now carried per wagon.

The milk produced by the 176 farmers hauling their own milk was 25,058 quarts, or about 143 quarts per farm, which is $3\frac{1}{2}$ 40-quart cans, or $4\frac{1}{3}$ 32-quart cans, so that these farmers were actually carrying between 3 and 4 cans each. The average 2-horse farmers' wagon can carry at least 30 cans, while trucks adapted for the purpose can carry between 40 and 50 cans; consequently, instead of the 176 farmers daily hauling milk to the shipping point, the same milk could be hauled in less than 20 trucks. If we assume the milk produced by the 496 farmers estimated as hauling from the entire producing territory is in the same proportion, instead of 496 wagons and horses and men the same milk could be hauled on less than 56 trucks.

TABLE No. 44

	Farmers Reporting.	Total Farmers.
	276	778
Hauling own milk.....	176	496
Present cost	\$143.26	\$403.74
Cost to main road.....	47.75	134.56
Trucking on main road.....	62.64	176.53
Total estimated cost.....	\$110.39	\$311.09
Total daily saving.....	\$32.87	\$92.65
Total yearly saving.....	\$11,997.55	\$33,817.25

X

DEALERS' DISTRIBUTION COSTS

The center of the milk problem in all cities is considered to be the cost of milk distribution. While there are some economies which could be secured through better business methods in the production of milk by the dairy farmer, it is well recognized that these are difficult to establish and would require a considerable number of years.

On the other hand, the inhabitants of every large city and the public officials are carrying on their agitation on the high cost of milk, principally with the thought in mind that the cost of distribution is excessive and that through some reorganization in the industry, or perhaps through municipal control or ownership, these costs can be greatly reduced.

In approaching this problem in this survey, a new method of investigation was planned. In all previous surveys the main dependence for the investigators into the cost of milk distribution has been the work of expert cost accountants who have devoted the greater part of their time to the examination of the dealers' books and the checking up of vouchers with book entries to determine whether these entries were correct or not.

The reports handed in as a result of the work of the expert accountants have, in every survey where this work has been done, presented to the investigators only a financial statement which the books themselves contained.

Such financial statements are unsatisfactory in two respects. In the first place, the methods of bookkeeping in the milk industry have never been standardized. Consequently the financial statements taken from dealers' books rarely correspond. For this reason, even though the financial statements may be correct, it is impossible to make accurate comparison of cost items between one milk company and another milk company.

The second and more serious cause for dissatisfaction with such figures is that they in no way reveal to the investigators what are the reasons or causes for these expenses, or whether the expenses are justified. Consequently, in all surveys whose main dependence has been placed on the work of auditors, it has been impossible for the directors of such surveys to draw conclusions or to make recommendations based on any accurate knowledge of expense items, or to state whether such expense items are justified or whether they could be reduced.

In order to overcome these difficulties in this Survey, a new plan was inaugurated which consisted in a study of the conduct of the business itself outside of the dealers' books. These studies were made by

inspectors in the employ of the Survey, who personally visited all of the large milk companies in the City of Rochester and a considerable number of the small dealers and, by personal observation of the work performed in these milk plants, took notes of each operation, the number of employees, the time occupied and the cost of performing every branch of the business.

The dealers' books were not neglected, as expert accountants were employed to take a statement from the dealers' books, chiefly for the reason that the factory charges or expenses outside of labor charges could not be obtained by inspection. The expert accountants employed by the survey were unable to find in the City of Rochester, however, more than four dealers who kept books in such a manner that the accounts could be relied upon. They visited 15 of the small milk dealers but were unable to secure figures from them which were sufficiently reliable to justify a report.

The new plan pursued in this survey consisted, in short, of making a careful study of the conduct of the business itself as the main dependence, rather than to place dependence upon an examination of the dealers' books.

In making these inspections of the milk factories, it was necessary to standardize the work by drawing up report blanks which could be used by each inspector so that the reports handed in would be uniform and also comprehensive. The points observed in connection with the conduct of the business included:

- (1) The total units of operation, such for example as the quantity of milk received, the quantity of milk bottled, the number of bottles washed, the number of cans washed, etc.

- (2) The number of persons employed in each operation.

- (3) The total number of hours of labor.

- (4) The wage rate per man hour.

- (5) The total cost of the operation.

- (6) The unit cost of the operation, for example, the cost per quart for milk received, the cost per bottle for bottles washed, the cost per can of cans washed.

There were more than 36 different operations examined in this way in these different milk factories.

In addition to the examination of the milk business of the dealers of Rochester in this manner, similar examinations were made of the largest milk business in the City of Ottawa, Canada; of the largest business in the City of Philadelphia, Pa., and of the largest milk companies in the City of Baltimore.

The reasons for the conducting of these examinations in these other cities were because it would be of great value in judging of the efficiency of the work in Rochester to be able to make comparisons between the total costs and the individual cost items in Rochester and similar cost items of other cities, and also because in the cities of Ottawa and Philadelphia economies have been instituted which might point the way toward the adoption of similar economies in Rochester.

In assembling all of the facts and figures accumulated by the inspectors and the cost accountants, it is recognized that the tabulation of these results could be drawn up in a number of different ways. The chief object which must be kept in mind in putting together these figures is the total cost for the City of Rochester. This means that the milk business of the City of Rochester must be looked upon as a unit. The inhabitants of the city are not particularly interested in the business of any individual dealer but in the business of the city as a whole. Therefore, the object of the tabulations which have been made has been to get together under a single head all of the different cost items for all of the dealers in the city so that a single simple statement can be made showing what the total milk supply for the entire city costs and what each of the different branches of expense connected with this supply costs.

In order to accomplish this, the figures must be assembled first for the individual dealers. This was done on a series of cards or report blanks on file in the office of the survey. It has not been thought necessary to present the individual costs of each individual dealer separately. In order, however, to secure an accurate statement for the entire city, it has been necessary that the costs of each dealer should be set down in some form and the best method seemed to be to divide the dealers into three groups for this purpose: the first group being dealers handling 500 quarts of milk or less; the second group dealers handling from 501 to 1,000 quarts; and the third group dealers handling over 1,000 quarts.

Before presenting these tabulations one other consideration is desirable. The cost of labor naturally belongs in a separate division from the cost of supplies and other plant expenses. Labor, being the human element in the business, lends itself to reorganization and business efficiency more easily than the purchase of supplies or other plant charges. Consequently, in this work, labor is separately considered and the payroll and salaries have all been studied from the standpoint of the labor performed as a separate problem.

In Table No. 45 are presented the labor costs for the first group of milk dealers, handling 500 quarts or less.

DETAILED LABOR COSTS FOR DEALERS HANDLING 500 QUARTS OR LESS

COSTS REPORTED BY 33 DEALERS					ESTIMATED TOTAL COSTS FOR GROUP OF 101 DEALERS										
OPERATION	Units of work.	Number of men.	Man hours.	Rate per hour.	Total daily labor cost.	Unit cost (Per unit of work)	Total units of work for dealers receiving 500 qts. or less.	Totals for Group.		Retail Bottled.		Wholesale Bottled.		Wholesale Cans.	
								Number men.	Man hours.	Cost daily.	Per Cent.	Cost daily.	Per Cent.	Cost daily.	Per Cent.
Milk receiving.....	9,864 qts.	42	15.75	439 \$	6,907	.0007002	28,006	119	44.7	\$19.61	81.7	\$16.02	\$2.75	4.3	\$0.84
Bottle washing.....	11,144 bts.	50	60.75	391	23,747	.0021309	31,640	142	172.5	67.42	85.4	57.57	9.85	..	..
Can washing.....	361 cns.	37	19.58	385	7,547	.0209058	1,025	105	55.6	21.43	76.8	16.46	2.85	9.9	2.12
Apparatus washing.....	9,864 qts.	38	22.00	386	8,486	.0008603	28,006	108	62.5	24.09	81.7	19.68	3.37	4.3	1.04
Past rizing & Cool'g.....	1,273 qts.	6	7.9	499	3,946	.0030998	1,816	8	11.3	5.63	81.7	4.60	.79	4.3	.24
Cooling.....	5,522 qts.	22	11.50	398	4,582	.0008298	26,240	105	54.6	21.77	81.7	17.79	3.05	4.3	.93
Bottling & Capping.....	10,550 bts.	51	49.50	404	20,016	.0018973	29,954	145	140.5	56.83	85.3	48.48	8.35	..	..
Can filling.....	18 cns.	2	1.25	482	602	.0334444	51 cn	6	3.5	1.71	40.0	.69	.17	50.0	.85
Retail delivery.....	7,921 qts.	51	193.60	392	75,925	.0095853	22,402	144	547.5	214.73	100	214.73	..	..	..
Wholesale delivery.....	1,468 bts.	..	..	..	..	..	3,838 bt	..	..	..	..	..	..	..	..
Do.....	316 cns.	42	29.40	395	11,603	.0065039	1,176 cn	118	82.6	32.61	..	..	24.95	23.5	7.66
Railroad to plant...	6,611 qts.	24	25.75	407	10,471	.0015839	16,115	59	62.8	25.52	81.7	20.85	3.57	4.3	1.10
Stable.....	6,844 qts.	25	30.50	414	12,628	.0018451	19,432	71	86.6	35.85	..	29.29	5.02	..	1.54
Garage.....	4,264 qts.	13	10.50	516	5,415	.0012699	12,106	37	29.8	15.37	..	12.56	2.15	..	.66
Engine room.....	1,950 qts.	6	6.25	354	2,215	.0011359	5,536	17	17.7	6.29	..	5.14	.88	..	.27
Refrigeration.....	500 qts.	2	2.00	376	751	.0015020	1,420	6	5.7	2.13	..	1.74	.30	..	.09
Plant protection.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Office force.....	3,911 qts.	13	26.75	392	10,496	.0026837	11,104	37	75.9	29.80	..	24.35	4.17	..	1.28
Collectors.....	9,864 qts.	40	77.42	410	31,763	.0032201	28,006	114	219.8	90.18	..	73.68	12.63	..	3.87
Superintendence.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Miscellaneous.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Canvassers.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Administration.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Salaries.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total.....	..	..	..	..	..	..	..	1673.6	\$670.97	..	\$563.63	..	\$84.85	..	\$22.49

In Table No. 45 attention is called especially to column No. 6, in which are set down the unit costs for each item of expense; thus, for example, in this list it costs 2.1 mills to wash a bottle; 2 cents to wash a can, 3 mills to pasteurize and cool milk, 3 cents to fill a can, etc.

In the last part of the tabulation are given the totals for the entire group and also a statement of the cost for each class of milk, including retail bottled milk, wholesale bottled milk and wholesale canned milk.

TABLE No. 46
DETAILED LABOR COSTS FOR DEALERS HANDLING 501 TO 1,000 QUARTS.

OPERATION.	COSTS REPORTED BY 12 DEALERS						ESTIMATED TOTAL COSTS FOR GROUP OF 23 DEALERS							
	Units of work.	Number men.	Man hours.	Rate per hour.	Total daily labor cost.	Unit cost (per unit of work).	Total units for group.	Totals for Group.			Retail Bottled.		Wholesale Bottled.	
								Number men.	Man hours.	Cost daily.	Per Cent.	Cost daily.	Per Cent.	Wholesale Cans.
Milk receiving.....	7,720 qts.	19	10.67	.433 \$	4,621	.00059857	15,786	39	21.8	\$9.45	78.5	\$7.42	19.5	\$.19
Bottle washing	9,455 bts.	21	37.50	.364	13,686	.00144748	19,334	43	76.7	23.34	80.7	23.34	19.3	5.83
Can washing	256 cns.	17	11.66	.366	4,276	.01670312	523	35	23.8	8.74	74.	6.47	18.4	1.61
Apparatus washing.	7,720 qts.	20	13.25	.418	5,548	.00071865	15,786	41	27.1	11.34	78.5	8.90	19.5	2.21
Pasturizing & Cool'g	3,757 qts.	8	14.00	.424	5,945	.00158237	8,430	18	31.4	13.34	78.5	10.47	19.5	2.23
Cooling	1,084 qts.	3	1.50	.464	697	.0064298	7,026	13	9.7	4.52	78.5	3.55	19.5	.88
Bottling & Capping.	8,893 bts.	22	30.75	.375	11,562	.00129899	18,184	45	62.9	23.62	80.	18.90	20.	4.72
Can filling	5,848 qts.	28	127.73	.402	51,421	.00879292	11,912	57	260.2	104.74	100.	104.75	..	..
Retail Delivery	*1,402 qts.	17	22.02	.477	10,510	.00068158	*2,964	36	46.6	22.24	..	..	..	..
Do.	†140 qts.	17	13.50	.505	6,821	.00093068	11,738	19	21.6	10.92	78.5	8.57	19.5	2.22
Railroad to Plant..	6,108 qts.	10	10.50	.476	4,999	.00081843	11,915	20	20.5	9.75	78.5	7.65	19.5	2.22
Stable.	3,777 qts.	6	5.25	.470	2,467	.00065316	7,723	12	10.7	5.04	78.5	3.96	19.5	2.20
Garage.	5,563 qts.	8	10.25	.443	4,540	.00081610	11,375	16	21.0	9.28	78.5	7.28	19.5	2.10
Engine room	3,676 qts.	5	3.25	.489	1,590	.00043253	7,559	10	6.6	3.27	78.5	2.57	19.5	1.81
Refrigeration	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Plant protection ...	3,570 qts.	5	15.00	.473	7,100	.00198879	7,300	10	30.7	14.52	..	11.40	..	2.64
Office force	7,720 qts.	17	32.20	.525	16,890	.0021788	15,786	35	65.8	34.54	..	27.11	..	2.83
Collectors	..	..	..	..	..	..	..	..	..	..	..	..	..	6.74
Superintendence. ...	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Miscellaneous	2,281 qts.	3	3.33	.541	1,800	.00078912	4,642	6	6.9	3.66	..	2.86	..	.73
Total.....	..	..	..	..	..	..	..	..	..	\$318.14	..	\$255.19	..	\$57.47
	..	..	..	..	..	..	..	..	..	..	..	..	..	\$5.48

*Quarts bottled.

†Quarts in cans.

In Table No. 46 are given similar labor costs for the group of milk dealers handling 501 to 1,000 quarts. A comparison of the costs of the different operations of this group with the dealers of the previous group is interesting; for example, in this group milk receiving costs .5 of a mill as compared with .7 in the previous group; washing a bottle 1.4 mills as compared with 2.1 in the previous group; washing a can costs 1 cent and 6 mills as compared with 2 cents in the previous group, etc.

Table No. 46 also shows the costs for the entire group and the costs for retail bottled milk, wholesale bottled milk and wholesale canned milk.

DETAILED LABOR COSTS FOR DEALERS HANDLING OVER 1,000 QUARTS.

OPERATION.	COSTS REPORTED BY NINE DEALERS					ESTIMATED COSTS FOR GROUP OF ELEVEN DEALERS									
	Units of work.	Number men.	Man hours.	Rate per hour.	Total daily labor cost.	Total for Group				Retail Bottled		Wholesale Bottled		Wholesale Cans.	
						Total unit of work per group.	Number men.	Man hours.	Daily cost.	Per Cent.	Cost daily.	Per Cent.	Cost daily.	Per Cent.	Cost daily.
Milk receiving	36,119 qts.	14	44.7	446	\$19,923	.00055161	15	47.4	\$21.12	65.7	\$13.87	13.1	\$2.77	21.2	\$4.48
Bottle washing	35,673 bts.	28	79.08	369	29,214	.00081891	30	83.8	30.96	83.4	25.82	16.6	5.14	..	..
Can washing	2,199 cns.	15	43.	384	16,530	.0075171	16	45.6	17.52	58.	10.16	11.5	2.02	30.5	5.34
Apparatus washing	36,119 qts.	31	48.	400	19,204	.00053171	33	40.9	20.35	..	13.37	..	2.67	..	4.31
Pasteurizing	31,112 qts.	10	33.91	565	19,147	.00061541	11	37.0	20.87	64.9	13.54	13.3	2.78	21.8	4.55
Cooling, bottling and capping	33,366 bts.	32	78.75	388	30,549	.00091561	34	83.5	32.38	83.4	27.00	16.6	5.38	..	..
Can filling	554 cns.	10	16.29	380	6,196	.0111841	11	17.3	6.57	5.8	3.81	11.5	.76	30.5	2.00
Driving Retail Routes	21,193 qts.	95	679.2	534	362,371	.01709861	103	736.8	393.11	..	393.11	..	..	..	..
Driving Wholesale Routes	*3,640 qts.	23	87.8	489	42,920	.00388311	25	95.3	46.59	..	..	50.	23.30	50.	23.29
Driv. R.R. to Plant	24,091 qts.	14	50.0	458	22,880	.00094971	15	54.4	24.90	65.7	16.36	..	3.26	..	5.28
Stable	36,119 qts.	18	83.78	400	33,531	.00092831	19	88.8	35.54	..	23.55	..	4.65	..	7.34
Garage	24,636 qts.	9	19.28	485	9,343	.00037921	10	20.3	9.85	..	6.47	..	1.29	..	2.09
Engine room	27,719 qts.	8	40.	480	19,218	.00069331	11	55.2	26.54	..	17.43	..	3.48	..	5.63
Refrigeration	14,243 qts.	6	14.5	468	6,78	.00047601	7	17.5	8.16	..	5.36	..	1.07	..	1.73
Plant protection	15,000 qts.	2	16.	261	4,17	.00027801	2	16.	4.17	..	2.74	..	.55	..	.88
Office force	33,276 qts.	23	165.5	377	62,36	.00187401	25	190.4	71.47	..	47.00	..	9.31	..	15.16
Collectors	36,119 qts.	35	122.25	445	54,35	.00150471	37	129.6	57.61	..	37.85	..	7.55	..	12.21
Superintendence	20,236 qts.	8	73.	676	49,38	..	8	73	49.38	..	32.44	..	6.47	..	10.47
Miscellaneous	11,836 qts.	14	59.10	339	20,02	..	15	62.6	21.22	..	13.94	..	2.78	..	4.50
Canvassers	12,836 qts.	8	48.28	506	24,45	..	8	48.3	24.45	..	16.07	..	3.20	..	5.18
Administration	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Salaries	23,836 qts.	8	..	..	116.64	..	8	..	116.64	..	76.63	..	15.28	..	24.73
Total	..	..	..	..	..	..	442	1943.7	\$1039.40	..	\$796.52	..	\$103.71	..	\$139.17

*Quarts in bottles.

†Quarts in cans.

In the Table No. 47 are presented the costs for the dealers handling over 1,000 quarts. It is most interesting to compare the costs of these three groups of dealers, item by item, and also to compare the costs for the different classes of milk. The object, however, of putting together the figures in this way is not limited to the interest attaching itself to these comparisons, but the main object is to pave the way for getting together the costs for the entire city which will be assembled in tabulations later on.

While the Survey has decided not to present the individual costs of all milk dealers in the City of Rochester for the purposes of comparison, it is thought desirable that the costs of a few of the companies should be presented. Consequently, in Table No. 48 are presented the costs for 4 of the large milk companies of Rochester and also for a large milk company in Philadelphia and in Ottawa, Canada.

TABLE NO. 48
UNIT LABOR COSTS

Labor Charges Operation.	101 Retail	132 Retail	47 Retail	301 Retail	320 Retail	119 Whole- sale
1. Milk receiving	.000436	.000267	.00043426	.00031906	.00073668	.000533
2. Bottle washing	.000582	.000538	.00208991	.00055966	.00108370	.000400
3. Can washing	.000349	.000350	.00024330	.00017808	.00017677	.000800
4. Apparatus washing ..	.000271	.000281	.00068870	.00012505	.00028645	.000400
5. Pasteurizing	.000280	.000196	.00058858	.00009670	.00005935	.000267
6. Cooling	..	..	.00002523	..	..	.000267
7. Bottling and Capping.	.000931	.000609	.00168480	.00046858	.00123760	.000267
8. Can filling	.000079	.000080	.00046136	.00002971	.00001898	.000533
9. Driving retail route..	.016962	.015935	.01909000	.00778920	.01800644	.000307
10. Driving wholesale ...	.001651	.000900	..	.00252836	..	.002300
11. Driving R. R. to plant	.001071	.000163	.00127200	.00075458	.00039759	.000800
12. Stable	.000984	.001138	.000839	.00101694	.00096669	.000133
13. Garage	..	.000450	.000284	.00011609	.00019873	.000267
14. Engine room	.000794	.000750	.00044077	.00080171	.00083911	.000400
15. Refrigerating plant ..	..	..	..	..	..	.000133
16. Plant protection	..	.000200	..	.00002902	.00003907	..
17. Experimental	..	..	..	.00019967	.00027550	..
18. Office force	.002399	.001750	.00206119	.00071302	.00299860	.001530
19. Collectors	.001201	.000892	.004775	..	..	.000600
20. Superintendence.	..	.003179	.00191696	.00009377	.00047762	.002200
21. Storage and loading..	..	..	.00041972	.00065046	.00090749	..
22. Refrigerator	..	..	..	..	.00024784	..
23. Trucking to branches	..	..	..	..	.00122896	..
24. Route returns	..	..	..	..	.00016575	..
25. Miscellaneous	..	.001000	.00152515	.00017278	.00025793	..
26. Tin shop	..	..	..	..	.00018750	..
27. Laundry	..	..	..	..	.00004196	..
28. Sales counter	..	..	..	..	.00032873	..
29. Wagon painting	..	..	..	..	.00019498	..
30. Plant painter	..	.000356	..	..	.00007522	..
31. Carpenter	..	..	..	..	.00011921	..
32. Creamery	..	..	..	..	..	..
33. Butter room	..	..	..	..	..	..
34. Specialties	..	..	..	..	..	..
35. Canvassers	.001830	..	.002732	..	..	..
36. Blacksmith	..	..	..	..	..	..
Sub Total	.029829	.029034	.04157193	.01664244	.03155445	.012137
Administration salaries ..	.007683	.006517	.00153	.00038696	..	.002237
Grand Total.....	.037512	.035551	.04310193	.01702940	..	.014374

In Table No. 48 are plants Nos. 101, 132, 47 and 119, all Rochester milk companies, and plant 301 which is an Ottawa milk company, and plant No. 302 a Philadelphia milk company. A study of these figures shows some remarkable differences; for example, under the head of "Can Washing" it is obvious that the Ottawa company and the Philadelphia company, which both have approximately the same charges, are washing cans by the use of apparatus at an expenditure of labor which makes these prices much less costly than the prices of can washing by any of the companies in the City of Rochester.

Under the head of "Pasteurizing," the cost of pasteurizing by the Ottawa milk company and the Philadelphia milk company is far lower than the cost of pasteurizing by any of the Rochester milk companies.

Under the head of "Driving Retail Routes," the cost for the City of Ottawa is far lower than the cost for any of the other companies in the list excepting plant No. 119, a Rochester company which has practically no retail business.

Under the head of "Office Force" is a most remarkable series of costs. In this instance the cost of office force for the Ottawa milk company is so much lower than the costs for any of the other companies that one would think the figure must be mistaken. It is, however, entirely correct and due to the establishment of a most efficient system of book-keeping by the Ottawa milk company.

The costs in the three groups of dealers appearing in the three previous tabulations have been assembled together in order to get the total cost per quart for retail bottled, wholesale bottled and wholesale canned milk for the entire City of Rochester. These costs have been obtained by putting together the costs of all of the dealers in the above group and dividing these costs by the amount of milk sold in each class. These results are shown in Table No. 49.

TABLE NO. 49

DISTRIBUTION OF LABOR COSTS PER QUART FOR RETAIL BOTTLED,
WHOLESALE BOTTLED AND WHOLESALE CANNED MILK
FOR ROCHESTER—BASED ON SALES.

OPERATION.	TOTALS FOR ROCHESTER.					
	Retail bottled. (57,305 qts.)	Unit cost per quart sold.	Wholesale bottled. (11,386 qts.)	Unit cost per quart sold.	Wholesale canned (8,888 qts.)	Unit cost per quart sold.
Milk receiving	\$ 37.31	.0006511	\$ 7.36	.0006464	\$ 5.51	.0006199
Bottle washing	106.73	.0018624	20.82	.0018289	..	..
Can washing	33.09	.0005774	6.48	.0005692	8.12	.0009135
Apparatus washing	41.95	.0007320	8.25	.0007247	5.58	.0006278
Pasteurizing	28.61	.0004992	6.17	.0005420	5.06	.0005693
Cooling.	21.34	.0003724	3.93	.0003452	1.02	.0001147
Bottling and capping...	94.38	.0016469	18.45	.0016206	..	..
Can filling	4.50	.0000785	.93	.0000817	2.85	.0003207
Driving retail routes ..	712.58	.0124348	..	..	..	..
Do. wholesale routes.	..	..	68.27	.0059970	33.17	.0037320
Do. R. R. to plant....	45.78	.0007988	8.96	.0007870	6.60	.0007426
Stable	60.49	.0010555	11.57	.0010163	9.08	.0010216
Garage	22.99	.0004011	4.42	.0003883	2.85	.0003206
Engine room	29.85	.0005208	6.17	.0005420	6.09	.0006852
Refrigeration plant ...	9.67	.0001687	2.01	.0001766	1.88	.0002115
Plant protection	2.74	.0000478	.55	.0000483	.88	.0000990
Office force	82.75	.0014440	16.31	.0014327	16.73	.0018823
Collectors	138.64	.0024193	26.92	.0023647	16.77	.0018868
Superintendence	32.44	.0005661	6.47	.0005683	10.47	.0011779
Miscellaneous	16.80	.0002932	3.51	.0003083	4.57	.0005141
Canvassers	16.07	.0002804	3.20	.0002811	5.18	.0005828
Administration salaries.	76.63	.0013372	15.28	.0013422	24.73	.0027824
Totals.....	\$1,615.34	.0281493	\$246.03	.0215720	\$167.14	.0187113

It must be borne in mind that the charges in this table are strictly limited to labor charges and include no other expenses. At the bottom of each column is given the total. Thus, for example, it will be noted that the total labor costs for the work performed in handling retail bottled milk is a little more than 2 cents and 8 mills per quart; the total cost for handling wholesale bottled milk is somewhat more than 2 cents and 1 mill per quart, while the handling of wholesale milk in cans is more than 1 cent and 8 mills per quart.

The total costs for all classes of milk and for all three groups of dealers shown in the previous tabulations have been assembled together in one table for the purpose of showing the total amount of milk handled, bottles washed, cans washed, apparatus washed, milk pasteurized, cooled and bottled, the number of cans filled, the amount of milk delivered at retail and at wholesale, the amount of milk received from the railroads,

etc., for the entire city. In short, all operations of all dealers have been assembled together and treated as if the city were conducting the milk business under a single head. Also all of the employees at present engaged in the business have been put together and all of the hours expended by them in their labor. The cost of each operation and the wages paid to the employees per hour and the total costs for the city also appear in this table. These figures are all assembled in Table No. 50.

TABLE No. 50

CITY TOTALS FOR UNIT OF LABOR INVOLVED IN EACH OPERATION

OPERATION	Number units of work.	Number of employees.	Number of man hours.	Units per man hour.	Cost per unit.	Rate per hour.	Total cost per day.
Milk receiving	82,075 quarts	173	113.9	721	.0006114	\$.441	\$ 50.18
Bottle washing	88,784 bottles	215	333.0	267	.0014366	.383	127.55
Can washing	3,879 cans	156	125.0	31	.0122944	.382	47.69
Apparatus washing	82,075 quarts	182	130.5	629	.0006796	.427	55.78
Pasteurizing & Cooling.	44,160 " "	37	79.7	554	.0009022	.500	39.84
Cooling	33,266 " "	118	64.3	517	.0007903	.409	26.29
Bottling and capping...	83,503 bottles	224	286.9	291	.0013512	.393	112.83
Can filling	638 cans	17	20.8	31	.0129781	.398	8.28
Retail delivery	57,305 quarts	304	1544.5	37	.0124349	.461	712.58
Wholesale delivery	11,386 qts. bottled } 8,888 qts. in cans }	179	224.5	90	.0050035	.452	101.44
Driving R. R. to plant..	54,072 quarts	93	138.8	390	.0011344	.442	61.34
Stable	69,630 " "	110	195.9	355	.0011653	.414	81.14
Garage	45,802 " "	59	60.8	753	.0007607	.498	30.26
Engine room	55,194 " "	44	93.9	588	.0007629	.448	42.11
Refrigerator	26,129 " "	23	29.8	877	.0005190	.455	13.56
Plant protection	15,000 " "	2	16.0	938	.0002780	.261	4.17
Office force	56,687 " "	72	297.0	191	.0020426	.390	115.79
Collectors	82,075 " "	186	415.2	198	.0022215	.439	182.33
Superintendence	20,236 " "	8	73.0	277	.0024402	.676	49.38
Miscellaneous	17,187 " "	21	69.5	247	.0014476	.358	24.88
Canvassers	12,836 " "	8	48.3	266	.0019048	.506	24.45
Administration Salaries	23,836 " "	8	..	..	.0048934	..	116.64
Total			4361.3				\$209.51
Average rate except administration						.438	

In Table No. 50, in column No. 5, appears the cost per quart of milk received, the cost per bottle for bottles washed, the cost per can for cans washed, etc., throughout the entire list, each unit cost representing the cost of performing the operation for each of the items included in such operation.

In column No. 7 appears the entire costs of the labor performed in Rochester for one day, showing that the daily payroll for all of the

people employed in the milk business amounts to \$2,029.51. In this table, for example, also appears the cost of bottle washing under present conditions, which is \$127.55; the cost of washing milk cans, \$47.69; the cost of pasteurizing, \$39.84; the cost of bottling and capping, \$112.83; the cost of delivering milk at retail, \$712.58, for one day.

This is the cost of labor only, the other cost items appearing in later tabulations.

It has often been alleged that the cost of performing the work of milk distribution is smaller for the small dealer than it is for the large dealer, and therefore that it is an advantage to any city to have its milk distributed by small dealers rather than by large dealers because it is more economical.

In this survey it has been believed that the city would expect to receive information on this particular point and, for this reason, the figures for the cost of doing business for dealers handling 500 quarts or less, for dealers handling 501 to 1,000 quarts, and for dealers handling from 1,000 upwards, have been separately tabulated for the entire operations performed by these dealers so far as their labor is concerned; for example, dealers handling under 500 quarts furnish to the City of Rochester a total of 23,006 quarts of milk daily, while dealers handling from 501 to 1,000 quarts handle a total of 15,786 quarts daily. The balance of the milk supply, amounting to 38,283 quarts, is handled by dealers whose business is in excess of 1,000 quarts a day.

For these three groups of dealers the figures have been tabulated in a new form by using the number of quarts of milk received by each group as a divisor. The cost of performing each of the labor operations by each of these groups of dealers has been divided by the number of quarts of milk received by each group. In this way the unit cost per quart for performing each operation has been based on the number of quarts handled by each group. These figures are shown in Table No. 51.

TABLE NO. 51

UNIT COST OF LABOR DETERMINED ON BASIS OF QUARTS OF MILK RECEIVED ON ONE DAY

OPERATION.	Under 500 qts. 23,006 qts. rec'd.		501 to 1,000 qts. 15,786 qts. rec'd.		1,001 and upwards, 38,283 qts. rec'd.		82,075 qts. rec'd.	
	Cost for group.	Unit cost per quart received.	Cost for group.	Unit cost per quart received.	Cost for group.	Unit cost per quart received.	Total city cost per operation.	Unit cost per quart received.
Milk receiving ..	\$ 19.61	.0007002	\$ 9.45	.0005985	\$ 18.71	.0004887	\$ 50.18	.0006184
Bottle Washing .	67.42	.0024078	29.17	.0018485	30.96	.0008087	127.55	.0015540
Can Washing ...	21.43	.0007653	8.74	.0005538	17.52	.0004576	47.69	.0005810
Appar'tus Wash'g	24.09	.0008603	11.34	.0007186	20.35	.0005317	55.78	.0006796
Past'iz'g & Cool'g	5.63	.0002010	13.34	.0008453	20.87	.0005451	39.84	.0004854
Cooling	21.77	.0007775	4.52	.0002864			26.29	.0013203
Bottl'g & Capp'g	56.83	.0020296	23.62	.0014968	32.38	.0008458	112.83	.0013747
Can Filling	1.71	.0000610			6.57	.0001716	8.28	.0001009
Driving Retail ..	214.73	.0076689	104.74	.0066375	393.11	.0102693	712.58	.0086820
Wholesale	32.61	.0011646	22.24	.0014093	46.59	.0012170	101.44	.0012359
R. R. to Plant.	25.52	.0009114	10.92	.0006920	24.90	.0006504	61.34	.0007473
Stable	35.85	.0012625	9.75	.0006178	35.54	.0009283	81.14	.0009886
Garage	15.37	.0005489	5.04	.0003193	9.85	.0002573	30.26	.0003686
Engine Room ...	6.29	.0002246	9.28	.0005880	26.54	.0006933	42.11	.0005130
Refrig'tion Plant	2.13	.0000760	3.27	.0002072	8.16	.0002131	13.56	.0001652
Plant Protection					4.17	.0001089	4.17	.0000508
Office Force	29.80	.0010642	14.52	.0009201	71.47	.0018740	115.79	.0014107
Collectors	90.18	.0032201	34.54	.0021878	57.61	.0015047	182.33	.0022215
Superintendence.					49.38	.0012899	49.38	.0006016
Miscellaneous ...			3.66	.0002319	21.22	.0005543	24.88	.0003031
Canvassers					24.45	.0006387	24.45	.0002978
Administration ..					116.64	.0030470	116.64	.0014211
Total	\$670.97	.0239439	\$318.14	.0201598	\$1039.40	.0271584	\$2029.51	.0247145

In Table No. 51 it appears that the total labor costs in dollars for group No. 1 is \$670.97 and that the cost per quart for handling and delivering milk by group No. 1 is .0239. Group No. 2 dealers, handling from 501 to 1,000 quarts, have a daily payroll of \$318.14 and the cost per quart for milk handling is .0201, which is less than the cost in the previous group. On the other hand group No. 3, which includes dealers handling more than 1,000 quarts daily, has a daily payroll of \$1,035.93, and a cost per quart for milk handling of .0270. This is the highest cost of all. It must be remembered, however, that this group, with one ex-

ception, are dealers who operate pasteurizers and therefore have more expensive machinery and also a larger daily payroll.

In the last two columns of this tabulation appear the total labor costs for the entire city based on the volume of milk received daily.

POSSIBLE REDUCTIONS IN LABOR COSTS

Each of the operations performed in connection with milk handling by the dealer has been treated by this survey as a separate enterprise. Independently of the methods of bookkeeping by the milk companies, the inspectors employed have visited the plants of the large milk dealers and taken careful notes concerning the different operations performed, the number of men employed, the volume of work performed by them, and the cost, basing this cost on the wages of the men and the number of hours they work. This has made it possible to express the work performed in "man hours" and the wages in dollars per man hour. These methods have been used for 54 out of the 136 milk companies in Rochester. In these 54 were included all of the large companies and a sufficient number of the small companies to furnish information which would fairly represent the costs of the labor performed by all of the small companies.

From the information obtained in this way the cost of each of the operations performed has been figured separately from the other operations, and the total cost for the entire City of Rochester obtained. The cost of the same list of operations has been obtained in the same way from milk companies in the cities of Baltimore, Philadelphia, and Ottawa, Can. The costs from these other cities are compared with the costs for the City of Rochester as the best means of determining whether Rochester costs are lower, higher, or the same as those in other cities. Each of the different milk operations is separately discussed in the following paragraphs and tabulations:

MILK RECEIVING

At the time the figures were obtained in the month of August the average quantity of milk received by the City of Rochester daily was 82,075 quarts. From the reports obtained by the inspectors 173 men are employed in this work for a period of 113.9 hours, which is at the rate of 721 quarts per man hour at a cost of .000611 per quart, and a yearly cost of \$18,315.70. In the same way, the figures for all of the other companies in all of the cities visited were obtained. A comparison of these figures is shown in Table No. 52.

TABLE NO. 52
MILK RECEIVING

Number of Company.	Quarts milk received daily.	Number of employees.	Total man hours.	Quarts per man hour.	Cost per quart.	
1	20,417	5	25.5	800.6	.000488	
2	16,056	4	26	617.5	.000493	
3	4,346	3	5	869.2	.000328	
4	64,800	12	214	302.8	.000736	
5	9,000	2	11	818.1	.000436	
7-R, Av.	82,075	173	113.9	721.0	.000611	
8	43,070	4	31	1,386.0	.000319	
Total present Rochester cost.....					.000611	Yearly Cost \$18,315.70
Estimated cost under centralized system					.000441	13,211.20
Annual saving					.000170	\$ 5,104.50

In Table No. 52 the most efficient company in the list receives 1,386 quarts per man hour, while 3 other companies receive over 800 quarts per man hour, consequently it seems fair to assume that under properly organized working conditions at least 1,000 quarts per man hour could be received. On this basis, and using the present Rochester wage scale for milk receiving of .441 per man hour, the total annual cost under a centralized system would be \$13,211.20. This would mean a saving under a centralized system of .000170, per quart, and an annual saving of \$5,104.50.

BOTTLE WASHING

The figures for bottle washing are made up from the same list of milk companies in Baltimore, Philadelphia, Ottawa, and Rochester, and include the Rochester average. These are presented in Table No. 53.

TABLE NO. 53
BOTTLE WASHING

Number of Company.	Bottles washed daily.	Number of employees.	Total man hours.	Bottles per man hour.	Cost per bottle.	
1	15,229	3	21	725.2	.000537	
2	13,540	7	63	214.9	.001255	
3	4,650	5	15.5	300.0	.000907	
4	90,000	21	214	336.4	.000866	
5	10,000	5	15	666.6	.000523	
6	8,320	4	11.33	734.3	.000517	
7-R, Av.	88,784	156	125	267.0	.001437	
8	46,034	7	64.75	710.9	.000525	
Present Rochester cost					.001437	Yearly Cost
Rochester cost under centralized system					.000547	\$46,555.75
Saving under centralized system					.000890	\$28,824.99

From the figures in Table No. 53 it appears that the average cost per bottle for bottle washing for all of the 88,784 bottles washed daily in the City of Rochester is .001437 per bottle, or a yearly cost of \$46,555.75.

It will be noted in the list of bottles washed per man hour that the average number of bottles washed by the City of Rochester per man hour is only 267, and that with one exception this is the smallest number of bottles washed per man hour by any company in the list. Three companies in the list wash more than 700 bottles per man hour. It seems fair to assume, therefore, that under proper business conditions over 700 bottles per man hour could be washed by the City of Rochester. One of the Rochester companies washes more than 700 bottles per man hour.

If we assume 700 bottles per man hour as a reasonable number under efficient methods, and use the Rochester average wage scale for bottle washing of .383 per man hour, the cost of washing one bottle under a centralized system would be .000547, and the yearly cost \$17,730.76. This would mean a saving on the cost of washing one bottle of .000890, and an annual saving of \$28,824.99.

CAN WASHING

The figures for can washing represent the same list of companies, and show that the total number of cans washed in the City of Rochester daily is 3,879 by 156 men working for 125 hours at the rate of 31 cans per man hour, and at a cost per can of .012294. The complete figures are shown in Table No. 54.

TABLE NO. 54
CAN WASHING

Number of Company.	Cans washed daily.	Number of employees.	Total man hours.	Cans per man hour.	Cost per can.	
1	897	5	34.5	26	.011583	
2	800	2	16	50	.005728	
3	150	1	4	37.5	.007405	
4	2,000	3	25	80	.005711	
5	311	1	9	34.5	.010099	
6	383	1	7	54.7	.007310	
7-R, Av.	3,879	156	125	31	.012294	
8	1,222	2	19	64.3	.006276	
Present Rochester cost					.012294	Yearly Cost \$17,406.85
Rochester cost under centralized system					.005969	8,450.76
Saving under centralized system					.006325	\$ 8,956.09

An inspection of the number of cans washed per man hour in Table No. 54 shows that with the exception of one company the number of cans washed in Rochester is the smallest per man hour. One company in the list washes 80 cans per hour; one, 64; two, 50 or more per hour. At the present Rochester cost of .012294 per can, the annual cost for can washing is \$17,406.85. The company in the list washing 80 cans per man hour does not wash the cans so efficiently as the company washing 64.3 per man hour. The conditions under which the cans are washed in this latter company can easily be imitated by any first class organization, and it is therefore proper to assume that under a centralized system Rochester could wash at least 64 cans per man hour. Using this figure and the present wage scale for can washing in Rochester, which is .382 per man hour, the cost for washing one can under a centralized system would be .005969 per can, or 8,450.76 per year. This would mean a saving of .006325 per can, and \$8,956.09 per year.

APPARATUS WASHING

In estimating the cost of apparatus washing a comparison is made between the total number of quarts of milk received daily by Rochester, and by milk companies in the same lists used in previous tabulations. It appears that in Rochester 182 men took part in this operation, with an expenditure of 130.5 man hours, and that this washing of apparatus is performed for an average of 629 quarts per man hour at a cost of .000680 per quart. These comparisons are shown in Table No. 55.

TABLE NO. 55
APPARATUS WASHING

Number of Company.	Daily quarts of milk received.	Number of employees.	Total man hours.	Quarts per man hour.	Cost per quart.	
1	20,417	23	32	638	.000428	
2	16,056	13	22.5	713.6	.000427	
3	4,346	5	10.5	413.9	.000628	
4	64,800	5	48	1,350	.000286	
5	9,000	7	7	1,285.7	.000271	
6	8,000	6	5.5	1,454.5	.000280	
7-R, Av.	82,075	182	130.5	629.0	.000680	
8	43,070	7	14.25	3,022.4	.000125	
Present Rochester cost					.000680	Yearly Cost
Rochester cost under centralized system					.000213	\$20,359.70
Saving under centralized system					.000467	6,395.90
						\$13,963.80

From Table No. 55 it appears that the present Rochester costs are .000680 per quart, or a daily cost of \$20,359.70. An inspection of the number of quarts per man hour for which the apparatus is washed in these different companies shows four companies with over 1,200 quarts per man hour, and one of these with over 3,000 quarts per man hour. If we assume that 2,000 quarts per man hour is a fair estimate for effective washing of apparatus, this would be only $\frac{2}{3}$ of the efficiency of the best company, and but 40% more than the efficiency of 2 others in the list. If we apply the Rochester wage scale for apparatus washing of .427 to 2,000 quarts per man hour, the cost per quart for washing apparatus under a centralized system would be .000213, and a yearly cost for the entire Rochester milk supply of \$6,395.90. This would effect a saving of .000467 per quart, and \$13,963.80 per year.

PASTEURIZING AND COOLING

The figures for pasteurizing and cooling for Rochester must be divided into two parts, for the reason that while many of the large dealers operate both pasteurizing machines and milk coolers, the majority of small dealers do not operate pasteurizers, but only operate a cooling apparatus, consequently in presenting these figures we have listed separately the figures for those dealers who operate both pasteurizers and coolers and those who operate only coolers. The volume of milk which is pasteurized and cooled was 47,373 quarts daily, and by these dealers there were employed 37 men for 79.7 man hours who pasteurized and cooled milk at the rate of 594.4 quarts per hour at a cost of .000841 per quart.

The dealers who were cooling milk only did not all of them report cooling charges. The number reporting cooling charges were handling 33,266 quarts with 118 men employed for a total of 64.3 man hours at the rate of 517 quarts per man hour, at a cost per quart of .000790. These figures are tabulated in Table No. 56.

TABLE NO. 56
PASTEURIZING AND COOLING

Number of Company.	Daily quarts pasteurized	Number of employees.	Total man hour.	Quarts per man hours.	Cost per quart.	
1	20,417	2	10	2,041.7	.000199	
2	16,056	2	14	1,146.8	.000323	
3	4,346	2	10	434.6	.000675	
4	64,800	1	10	6,480	.000059	
5	9,000	1	5	1,800	.000203	
6	8,000	1	3.66	2,185.8	.000195	
7-R, Av.	47,373	37	79.7	594.4	.000841	
*7-R, Av.	33,266	118	64.3	517	.000790	
8	43,070	3	11.5	3,745.2	.000096	
						Yearly Cost
Present Rochester Costs, for companies bottling, pasteurizing and cooling					.000841	\$14,541.60
Present Rochester costs, for companies cooling only					.000790	9,595.85
Total present Rochester costs						\$24,137.45
Rochester costs under centralized system					.000091	2,723.40
Savings under centralized system					.000750	\$21,414.05

(*Cooling charge where no pasteurizing is done.)

If we apply these figures to the volume of milk mentioned at the Rochester rate of .50 per man hour, the present cost for companies both pasteurizing and cooling amounts to \$14,541.60 per year, and for the companies cooling only \$9,595.85 per year, or a total of \$24,137.45 per year for the quantity of milk reported. Under a centralized system milk can be pasteurized by large sized machinery. The manufacturing companies many of them build machines capable of pasteurizing 12,000 lbs. of milk per hour, which is at the rate of more than 5,500 quarts per hour.

It will be noted in the table that one large company handling 64,800 quarts daily pasteurizes at the rate of 6,480 quarts per hour. Assuming under a centralized system that Rochester could pasteurize milk with apparatus which would handle 5,500 quarts per hour the cost would be .000091 per quart, or \$2,723.40 per year. In presenting these figures it is necessary to bear in mind that in the tabulation above only 47,373 quarts

were pasteurized out of a total of 82,075 quarts received by the City of Rochester at the time these figures were obtained. This is 57% of the entire Rochester supply, therefore the costs for pasteurizing milk are costs representing the pasteurization of only 57%, and would be much larger annually if all of the milk of Rochester were pasteurized by the present system. In presenting figures for the centralized system we are assuming that the entire Rochester supply of 82,075 quarts is pasteurized by modern apparatus.

The saving per quart under the methods used in the centralized system as compared with the present Rochester methods of pasteurizing is .000750. The annual saving by the adoption of the centralized method over the present costs for milk which is both pasteurized and cooled and for the milk which is cooled only is \$21,404.05. If a pasteurizing ordinance were put in force in Rochester without any effort to centralize the business, and the same pasteurizing costs which exist at present were applied to the entire supply the total cost for pasteurizing under present conditions by the present methods would be \$25,192.00 yearly.

BOTTLING AND CAPPING

The figures presented for bottling and capping include all of the Rochester milk companies which are bottling milk, both in quart bottles and in pint bottles. The total number of bottles which are filled daily, both quarts and pints, is 83,503. For this work there are employed in Rochester 224 persons for a period of 286.9 hours, who bottle and cap bottles at the rate of 291 per hour at a cost of .001351 per bottle, or \$41,182.95 yearly. A comparison of these figures with the figures obtained from other companies is shown in Table No. 57.

TABLE NO. 57
BOTTLING AND CAPPING

Number of Company.	Number of bottles, quarts and pints.	Number of employees.	Total man hours.	Bottles per man hour.	Cost per bottle.	
1	15,229	13	75	203	.001430	
2	13,540	10	53	255.4	.001184	
3	4,650	4	12	387.5	.000701	
4	90,000	21	192	375	.000799	
5	7,690	6	24	320.4	.001089	
6	8,320	4	12.5	665.6	.000585	
7-R, Av.	83,503	224	286.9	291	.001351	
8	46,034	6	56.5	814.7	.000438	
Present Rochester costs					.001351	Yearly Cost \$41,182.95
Rochester Costs under centralized system					.000561	17,111.55
Savings under centralized system					.000790	\$24,071.40

It will be noted in the column entitled "Bottles per Man Hour," in Table No. 57, that the number of bottles filled and capped in Rochester is considerably lower than the number for 5 of the milk companies in the list. By the use of a proper type of machinery and proper arrangement for bringing bottles to the machine and taking them away, the work can be done most rapidly and efficiently. By such methods it will be noted that one company fills and caps bottles at the rate of 814.7 per man hour and another at the rate of 665.6 per man hour.

If we assume that a fair estimate for Rochester would be 700 bottles per man hour, the cost of capping and bottling would be .000561 per bottle, or \$17,111.55 per year. This would mean a saving on the cost of each bottle of .000790, and a yearly saving of \$24,071.40.

CAN FILLING

The figures obtained from the companies given in Table No. 58 on can filling are incomplete. Complete figures were secured from only 4 companies in addition to the average for the City of Rochester. The total number of cans filled in the City of Rochester each day is 638. In this work there are 17 men employed for a total period of 20.8 hours at the rate of 31 cans per man hour, and at a cost of .012978 per can, and a yearly cost of \$3,022.20.

TABLE NO. 58

CAN FILLING

Number of Company.	Number of cans.	Number of employees.	Total man hours.	Cans per man hour.	Cost per can.	
1		1	2			
2		1	4			
3						
4	215	1	5	43	.005725	
5	93	2	2	46	.007505	
7-R, Av	638	17	20.8	31	.012978	
8	121	1	3	40	.010578	
Present Rochester costs					.012978	Yearly Cost \$3,022.20
Rochester costs under centralized system					.008844	2,059.61
Savings under centralized system					.004134	\$ 962.59

If we assume that cans can be filled at the rate of 45 per man hour, and use the Rochester wage scale of .398, under a centralized system the cost of filling 1 can would be .008844, which gives an annual cost of \$2,059.61. This shows a saving in the filling of 1 can of .004134, and an annual saving of \$962.59.

DRIVING RETAIL ROUTES AND WHOLESALE ROUTES

Much difficulty is always encountered in drawing up a statement of the cost of milk delivery, for the reason that some milk companies conduct a business almost wholly composed of retail milk, others a business in which both retail and wholesale trade are factors, and others a business which is practically limited to the wholesale trade. In the matter of delivery wagons, some companies divide their business so that retail milk is carried entirely by retail wagons, while wholesale milk is carried by wholesale wagons. Other companies, on the other hand, carry all classes of milk on the same wagons and conduct what is called a mixed delivery system. In order to arrive at a fair estimate of the cost of milk delivery, therefore, it is necessary to take into consideration these different methods of delivery. Some of the companies which are delivering milk at the lowest cost use the mixed delivery system, carrying all classes of milk on the same wagons. In the City of Rochester the milk companies represent all of the types of delivery above mentioned.

A comparison of the cost of delivery in Rochester with the cost of delivery by the other companies in the list is shown in Table No. 59.

TABLE No. 59
DRIVING RETAIL AND WHOLESALE ROUTES

Number of Company.	Quarts of Milk.	Number of Drivers.	Total Man Hours.	Quarts per Man Hour.	Quarts per Wagon.	Cost per Quart.	
1. Retail	16,780	49	445		342.4		
Wholesale ...	3,637	3	18		1,212.3		
Total	20,417	52	463	44.1	392.6	.013437	
2. Retail	15,176	55	495		275.9		
Wholesale ...	880	1	2		880		
Total	16,056	56	497	32.3	286.7	.018646	
3. Retail	4,346	15	157		289.7		
Wholesale ...							
Total	4,346	15	157	27.6	289.7	.015706	
4. Retail	59,000	148	2,528		391.9		
Wholesale ...	6,800	2	20		3,400		
Total	65,800	150	2,548	25.8	432	.015988	
5. Retail	5,066	15	97.5		337.7		
Wholesale ...	3,292	4	24		823		
Total	8,358	19	121.5	68.8	439.8	.011111	
6. Retail	5,303	26	208		203.9		
Wholesale ...	1,052	2	16		526.0		
Total	6,355	28	224	28.4	226.9	.01891	
7-R, Av. Retail.....	57,305	304	1,544.5	37.0		.012434	
Wholesale...	20,274	179	224.5	90.0		.005003	
Total	77,579		1,769	43.8	279	.010493	
8. Retail	25,209	64	512		393.9	.007789	
Wholesale ...	12,850				200.7	.002528	
Total	38,059			74.3	594.6	.005627	
Present Rochester costs.....						.010493	Yearly Costs
Rochester costs under centralized system.....						.006571	\$297,117.30
Savings under centralized system.....						.003922	186,078.53
							\$111,038.77

In Table No. 59 is a statement of the number of quarts delivered per man hour, and also the number of quarts delivered per wagon. An inspection of the number of quarts per man hour shows that company No. 8 handles 74.3 quarts per man hour with a trade consisting of about two-thirds retail and one-third wholesale business; and company No. 5 handles 68.8 quarts per hour with a business consisting of about two-thirds retail and one-third wholesale. It will be noted that the business for the City of Rochester, which is No. 7 in the list, consists of 57,305 quarts retail, and 20,274 quarts wholesale, a proportion which is not far from the proportion of retail to wholesale business above mentioned.

The number of vehicles used in milk delivery for both wholesale and retail trade in the City of Rochester is 207 wagons and 71 automobiles, or a total of 278. The reports indicate that 304 men are employed in the retail delivery and 179 in the wholesale delivery. The figure 179, however, includes a number of the men who are also working on the retail delivery. The total number of man hours consumed for Rochester is 1,769, and the rate of delivery both wholesale and retail is 43.8 quarts per man hour, and 279 quarts per wagon for all classes of trade.

It will be noted that company No. 8 in the list delivers milk at the rate of 594.6 quarts per wagon; company No. 5 at the rate of 439.8; company No. 4 at the rate of 432; and company No. 1 at the rate of 392.6.

A review of the volume of milk carried on the wagons of the companies in the list, and of the opportunities for efficiency under a centralized system justifies the belief that the number of quarts per wagon delivered by the company showing the highest degree of efficiency, which is 594.6 quarts, could be approached under a centralized delivery system. The more correct method of measurement, however, is the number of quarts delivered per man hour. It will be noted that company No. 8 delivers 74.3 quarts per man hour, while company No. 5 delivers 68.8 quarts per man hour. We will therefore assume that under a centralized system as much as 70 quarts per man hour could be delivered. Using the average wage scale for the City of Rochester for milk delivery of .46 per man hour gives a cost per quart of .006571, and an annual cost under a centralized system for the labor of milk delivery of \$186,078.53. These figures show a total saving under a centralized system for each quart of milk of .003922, and a total annual saving on the entire supply of the city of \$111,038.77.

It must be remembered that these figures do not include the entire cost of milk delivery or the entire savings that can be effected on milk delivery under a centralized system. The figures here presented refer only to the pay roll or salaries of the milk drivers, and not to any other item of expense connected with the cost of distribution. Other such items, for example, as the cost of feeding horses, stable charges, the cost of wagons, depreciation, the cost of harness and other stable and wagon supplies, the cost of ice, etc., are all expenses belonging to the cost of milk delivery. These items will be discussed later on. The saving of \$111,038.77 is a saving strictly limited to the pay roll, or salaries of milk drivers.

If 70 quarts per man hour is a fair estimate of the number of quarts delivered, and each driver is employed for an 8-hour day, this would mean a total delivery for each man of 560 quarts daily. For the entire amount of milk sold in the City of Rochester at the time these figures

were taken, amounting to 77,579 quarts, a wagon delivery of 560 quarts per wagon would require only 139 wagons, instead of 278 now employed. This would be a saving of 139 wagons, and would mean therefore a reduction of the present number of wagons by one-half.

In the experiment in milk delivery conducted under the direction of Dr. John R. Williams in 1911, he concluded that one truck drawn by two horses and manned by three men could deliver an average of 3,200 quarts of milk in one working day of eight hours. This was at the rate of 400 quarts per hour for 3 men, or 133 quarts per man hour. In some cities where the distributing business is in the hands of companies having almost a monopoly, the use of two horses on a wagon and two men has greatly increased the number of quarts delivered per man hour. Under a centralized system where the business of milk delivery was in the hands of one company it seems fair to believe that in many sections of the city larger delivery wagons than the one-horse wagons now used could be used to advantage, drawn by two horses and operated by two or more men, with an increased volume of milk per man hour.

The figures given above in our estimate are based on actual business conditions as at present existing in some cities.

HAULING FROM RAILROAD PLATFORM TO MILK PLANT

Many milk factories are so located in the city that they are some distance from the railroad terminals at which milk is received, consequently it becomes necessary to employ trucks for carting milk from the railroad platform to the milk factory. Considerable expense attaches itself to the labor of loading and unloading these trucks, even though the actual distance traveled between the railroad and the milk plant is short. The variation in the distance and in the time consumed makes accurate comparisons of costs impossible.

It is of value, however, to compare the cost of this work among the different companies in our list, for the reason that some economies can be secured through the trucking of milk under a centralized system, as compared with trucking the same milk under a competitive system. The comparisons of this work as performed by the different companies are shown in the Table No. 60.

TABLE No. 60

HAULING FROM RAILROAD PLATFORM TO MILK PLANT

Number of Company.	Quarts Carried.	Number of Employees.	Total Man Hours.	Quarts per Man Hour.	Cost per Quart.	
1	20,417	3	20	1,021	.000323	
2	16,056	6	37	434	.000789	
3	4,346	2	10.5	414	.000702	
4	65,800	7	66.0	997	.000397	
5	6,343	2	6.00	1,057	.000751	
6	2,740	1	3.00	913	.000475	
7-R, Av.	54,072	93	138.8	390	.001134	
8	43,070	9	81.00	532	.000754	
Present Rochester cost.....					.001134	Yearly Cost 22,389.10
Rochester cost under centralized system.....					.000442	8,723.44
Saving under centralized system.....					.000692	\$13,665.66

In Table No. 60 it appears that 54,072 quarts of the milk received by the City of Rochester arrives by rail and is carried in trucks, handled by 93 employees working 138.8 man hours, at the rate of 390 quarts per man hour, and at a cost of .001134 per quart. This means that the annual cost of trucking for the City of Rochester under present conditions is \$22,389.10. This represents the milk hauled from the railroad to the numerous plants in the city which obtained their milk in this way. Under the present system not only is this milk hauled from the railroad in the trucks of the large dealers, but in the wagons of the numerous small dealers who obtained their milk from the railroad.

A study of the number of quarts per man hour in the above table shows that two companies handle more than 1,000 quarts per man hour, and two other companies between 900 and 1,000. One thousand quarts of milk means only 25 40-quart cans, or 31 32-quart cans. This is not a very heavy load for a medium size truck, and it seems reasonable to believe that under a well organized trucking system one man could handle at least 25 40-quart cans, or 31 32-quart cans per hour, from the railroad to the milk plant. On this assumption, using the average wage scale for drivers performing this work in the City of Rochester of .442 per hour, the cost per quart under a centralized system would be .000442, and the annual cost \$8,723.44. This would mean a saving per quart of .000692, and an annual saving of \$13,665.66.

STABLE AND GARAGE

Some of the companies in the list deliver milk only by the use of horses, others use automobiles to some extent. The labor in caring for horses and in caring for the automobiles used has been combined for all companies in Table No. 61.

TABLE No. 61
STABLE AND GARAGE

Number of Company.	Total Quarts of Milk Received.	Number of Employees.	Total Man Hours.	Quarts per Man Hour.	Unit Cost Per Quart.	
1	20,417	12	115	177	.001165	
2	16,056	7	62	258	.000912	
3	4,346	6	36	121	.002108	
4	65,800	22	198.9	331	.001151	
5	9,000	3	27	333	.000984	
6	8,000	4	29	276	.001589	
7-R. Av.	83,075	168	256.7	320	.001357	
8	43,070	11	84.2	512	.000799	
Present Rochester cost					.001357	Yearly Cost
Rochester cost under centralized system.....					.000868	\$40,661.00
Saving under centralized system.....					.000487	26,003.00
						\$14,658.00

In Table No. 61 it will be noted that for the City of Rochester there are 168 men employed in caring for horses and automobiles working 256.7 man hours at the rate of 320 quarts of milk per man hour, and at a cost of .001357 per quart. The most efficient company operates at the rate of 512 quarts per man hour. This company has a practical monopoly of the business in its city, and its efficiency is due to the fact that its horses are all in one large up-to-date stable with every facility for efficient handling, and its automobiles in one garage adjoining the stable.

Under the present system in Rochester there are numerous small horse stables and garages scattered throughout the city, each company being possessed of one or more. Under this system the present yearly cost for labor is \$40,661. It is obvious that if these numerous small stables and garages were abandoned and the horses and automobiles cared for in larger units, there would be considerable saving in these labor charges. It is believed to be fair to assume that the efficiency in quarts per man hour would approach that of the most efficient company in the list. Assuming 500 quarts per man hour as the basis under a centralized system, and using the Rochester average wage scale of .434 per hour, the cost under a centralized system would be .000868 per quart, and a yearly

cost of \$26,003. This would mean an annual saving of .000487 per quart, and \$14,658 per year.

ENGINE ROOM AND REFRIGERATING PLANT

Only a small number of the companies in Rochester operate an engine room and boiler, and a still smaller number operate a refrigeration plant. These charges have been combined for the purpose of determining the total expense for the operation of all of these plants in Table No. 62.

TABLE No. 62

ENGINE ROOM AND REFRIGERATING PLANT

Number of Company.	Quarts of Milk Received.	Number of Employees.	Total Man Hours.	Quarts per Man Hour.	Cost per Quart.	
1	20,417	..	..	..	.005383	
2	16,056	6	60	268	.001799	
3	4,346	2	22	198	.001710	
4	65,800	11	92	715	.000839	
5	9,000	2	18	500	.000794	
6	8,000	1	8	1,000	.000750	
7-R, Av.	55,194	67	123.7	446	.001009	
8	43,070	8	72	598	.000801	
Present Rochester cost.....					.001009	Yearly Cost
Rochester cost under centralized system.....					.000558	\$20,319.55
Saving under centralized system.....					.000451	16,714.08
						\$3,605.47

The total number of quarts of milk in Rochester which is distributed by companies operating engine rooms and by companies operating refrigerating plants also is 55,194 quarts. The work is performed by 67 men working 123.7 hours at the rate of 446 quarts of milk per man hour, and at a cost of .001009 per quart. The yearly cost of operating these plants under present conditions is \$20,319.55.

An inspection of the figures in Table No. 62 shows great variation in the cost per quart and in the number of quarts per man hour. Factories Nos. 1 and 8 had a large ice cream business in addition to their milk business using the same power plant and refrigerating plant, and the costs of operating the entire plant are therefore larger than they would be for milk alone. Plants Nos. 3, 5 and 6 are comparatively small, and are equipped with power machinery and refrigerating machinery which because of its small size cannot give the economies that would be obtained from machinery large enough to furnish power and refrigeration for the

entire milk supply of the City of Rochester. Plant No. 4, which is the largest sized plant in the list, is able to furnish power and refrigeration through the labor of 11 employees working 92 man hours. This plant is admittedly at the present time not equipped with the best type of equipment. We have selected as a fair basis for the labor of operating the engine room and refrigerating plant of a sufficient size to furnish power and refrigeration for the entire milk supply of Rochester the labor of 12 employees at 8 hours daily, or a total of 96 man hours. Using the average Rochester wage scale of .477 per hour, this would give a cost per quart for the entire milk supply of 82,075 quarts of .000558 per quart, and a yearly cost of \$16,714.08.

In considering this figure, it must be borne in mind that at the present time only 55,144 quarts of the milk supply of the city is handled by power plants and refrigerating plants worthy of the name. It would be expected therefore that considerable additional expense would be necessary to furnish proper machinery of this kind for the handling of the entire milk supply, consequently under a centralized system one would not expect to show a saving in this department of the business which would correspond to the savings shown in other departments as the result of a centralized system. The savings per quart from the above figures would be .000451, and the annual saving through abandoning the numerous small boilers, engines, and refrigerating plants, and centralizing this work in large plants would be \$3,605.47.

Under such a centralized system the greatest advantage obtained would consist in the application of the best possible methods of sterilization and of pasteurization and cooling of the entire supply.

PLANT PROTECTION

This item of expense refers to the fact that factories which contain valuable machinery and equipment must employ night watchmen as caretakers. In the City of Rochester at the present time there are only 2 men employed in this way. The cost of these men is \$4.17 daily, as they only work part time on this service. This is a yearly cost of \$1,522.45. Under a centralized system the services of these men would still be necessary, and we would not anticipate any great reduction in this cost.

EXPERIMENTAL

This item refers to the operation of laboratories for the testing of milk for butter fat and for bacteria. In five of the plants in the list such laboratories are operated, while in the City of Rochester under the auspices of the milk dealers themselves there are no such laboratories or laboratory workers. The cost of performing this work in the five plants mentioned is shown in Table No. 63.

TABLE No. 63
EXPERIMENTAL

Number of Company.	Quarts Received.	Number of Employees.	Total Man Hours.	Quarts per Man Hour.	Cost per Quart.	
1	20,417	4			.000127	
2	16,056	4			.000234	
3	4,346	4			.000157	
4	65,800	5.5	44		.000275	
5						
6						
7-R, Av.						
8	43,070	2	18		.000199	
Present Rochester cost					.00000	Yearly Cost .00000
Cost under centralized system.....					.000081	\$2,080.00
Additional expense					.000081	\$2,080.00

The cost of the operation of laboratories is difficult to standardize, for the reason that the amount of work depends greatly on local conditions, and how much experimental work the management of the milk plant desires to carry out. In the plants listed in Table No. 63 it can be seen that the first three plants employ four laboratory workers each, while plant No. 8 employs only two such workers. Under a centralized system it is clear that only one laboratory would be necessary. A fair basis for the testing of the milk supply of Rochester under such a centralized system would be two laboratory workers, working a total of 16 man hours at a cost of .41 per hour. This would be a cost of .000081 per quart, or \$2,080.00.

OFFICE FORCE

Only a small number of the milk companies in the City of Rochester make any attempt to keep books. The cost accountants employed by the Survey found only four companies who kept books by methods sufficiently accurate to justify the use of the figures as a basis for the costs reported by them. The bookkeepers employed by these companies and the small amount of bookkeeping done by a number of the other companies included a total volume of business of 56,687 quarts of milk. The total number of persons employed in keeping such accounts for Rochester is 72, working for a period of 297 man hours, at the rate of 191 quarts of milk per man hour, and at a cost of .002042 per quart. Included in these 72 persons are about 47 who work on an average of about two hours per day on their milk accounts. The bookkeepers employed by all of the companies, including Rochester, and the work performed is shown in Table No. 64.

TABLE No. 64
OFFICE FORCE

Number of Company.	Quarts Received.	Number of Employees.	Total Man Hours.	Quarts per Man Hour.	Cost per Quart.	
1	20,417	31	144.6	141	.002944	
2	16,056	20	120	133	.003307	
3	4,346	5	41	106	.003508	
4	65,800	51	370	177	.002998	
5	9,000	5	42.5	212	.002399	
6	8,000	6	440	182	.001750	
7-R, Av.	56,687	72	297.0	191	.002043	
8	43,070	9	81.0	532	.000713	
Present Rochester costs					.002043	Yearly Cost \$42,263.35
Rochester costs under centralized system.....					.000780	23,366.75
Savings under centralized system.....					.001263	\$18,896.60

The present cost of the bookkeeping which is being done is \$42,263.35 per year. An inspection of the work performed by the companies in Table No. 64 shows a most remarkable difference between the cost of bookkeeping in company No. 8, and the cost in all of the other companies. This low cost might be attributed to a difference in wage scales if one overlooked the number of bookkeepers employed, but an inspection of the table shows that plant No. 8 employs only nine bookkeepers to keep accounts for 43,070 quarts of milk, which is at the rate of 532 quarts per man hour. No other company in the list employs so small a number of bookkeepers for the volume of milk. It might also be assumed that the books of company No. 8 were not properly kept. This, however, is answered by an inspection of the costs in all other departments of the business. A review of the tabulations will show that in the majority of the labor costs plant No. 8 has lower costs than the other companies, and this is convincing evidence that the business in plant No. 8 is well managed.

The real reason for the low cost of bookkeeping in plant No. 8 is in the system of accounting which has been adopted. There is such a thing as too much bookkeeping and too much detail in the accounts which are kept of the milk business. What is required is to keep only such accounts as will furnish to the management the information necessary for administering the business in the most efficient manner. This seems to have been accomplished to a remarkable degree in the business of company No. 8, consequently with such results in mind it seems proper to assume as a basis for a centralized system such a system of bookkeeping

as this. It is therefore assumed that under a centralized system for Rochester the number of employees in an accounting system of the same kind would work at the rate of 500 quarts per man hour. Applying the Rochester wage scale for bookkeepers of .390 per hour would make the cost per quart for the entire milk supply of Rochester for bookkeeping .000780 per quart, and the yearly cost \$23,366.75.

This would result in a saving of .001263 per quart, and \$18,896.60 per year. In considering these savings it must be remembered that under the centralized system the costs suggested would provide an adequate bookkeeping system for the entire milk supply of Rochester of 82,075 quarts, while the present costs for the city are applied to only 56,687 quarts. The extension of the bookkeeping system to the entire supply, therefore, includes an expense which is not provided for by the present system. On the other hand, the economies under the centralized system are so great that they would show the savings indicated. The actual number of bookkeepers necessary under the centralized system would be 24, working seven hours daily.

COLLECTORS

One of the most important items of expense in milk distribution consists in the labor of collecting money from milk consumers. The majority of milk consumers pay cash for milk at least once a week. This cash is collected in most instances by the milk drivers. Among the larger companies, however, a few special collectors are employed for this purpose. In securing information from the Rochester companies regarding the cost of distribution, the number of hours spent by the milk drivers and by these special collectors and the cost were estimated independently of the cost of driving retail and wholesale routes. For the 82,075 quarts of milk received daily, the number of men engaged in collecting money from the reports obtained was 186. It seems probable, however, that all of the men engaged in driving both retail and wholesale routes at times take part in the work of milk collection.

The men reported as doing this work were engaged for a period of 415.2 man hours daily which is at the rate of 128 quarts per man hour at a cost per quart of .002221 per quart. In assuming the yearly cost Sundays are omitted as it is assumed that the collectors do not make a business of collection on Sundays. On this basis the yearly cost is \$57,069.29. Under a centralized system the reduction in the cost of milk collections would depend chiefly on the reduction in the number of milk wagons and milk drivers. In the table on driving retail and wholesale routes it is estimated that the milk supply of Rochester could be delivered with 139 wagons as against the 278 wagons now used. A comparison of the cost of milk collection and of the work performed in this department of the

business by the companies whose figures have been used in previous tables appears in Table No. 65.

TABLE No. 65
COLLECTORS

Number of Company.	Quarts Received.	Number of Employees.	Total Man Hours.	Quarts per Man-Hour.	Cost per Quart.	
1						
2						
3	4,346	2	6	724	.000657	
4						
5	9,000	3	25.5	353	.001210	
6	8,000	2	17.0	471	.000892	
7-R, Av.	82,075	186	415.2	198	.002221	
8						
Present Rochester costs.....					.002221	Yearly Cost \$57,069.29
Rochester costs under centralized system.....					.001110	28,534.64
Savings under centralized system.....					.001110	\$28,534.64

From Table No. 65 it is to be noted that four of the companies employ no collectors. In these cases the entire work of milk collection is performed by the milk drivers themselves, the expense of collecting being included in the drivers' wages. Company No. 8, which is the most efficient company in the list, employs no milk collectors, the wage scale for milk drivers being no higher than the wage scale for milk drivers in Rochester. In order to stimulate milk collection, part of the wages of the drivers consists of premiums paid on the amount of money collected.

Under such conditions it would not be necessary under a centralized system to add any expense above the drivers' wage scale for milk collection. In order, however, to make the estimate of cost under a centralized system a liberal one, it will be assumed that all of the drivers of the 139 delivery wagons under the centralized system receive additional compensation above their wages in premiums for milk collection, and since the number of wagons is exactly one-half the present number employed by the City of Rochester, a fair basis for the cost of milk collection would be one-half of the present cost. This would amount to .001110 per quart, and an annual cost of \$28,534.64. This would result in a saving of .001110 per quart, and an annual saving of \$28,534.64 on this item.

SUPERINTENDENCE

As a special item of milk delivery expense there has been separated from the other items the cost of superintendence. This refers to the em-

ployment of men who are not members of the administrative staff, but who are in charge of such operations as pasteurizing and other plant operations, livery stable, wagon house, and other departments of the business. Their salaries do not come under the head of ordinary labor or of administrative salaries. In the City of Rochester the majority of milk dealers do not employ such men; only four of the larger milk companies have them on their pay roll. The number of quarts of milk represented by these companies is 20,236 quarts. The number of man hours which these superintendents work is 73 daily, representing 277 quarts per man hour, at a cost of .002440 per quart. The yearly cost is \$18,023.70. Under a centralized system the number of superintendents necessary would be reduced because the departments over which they exercised their authority would be centralized. It is estimated that not more than four superintendents would be required. Work of superintendents has been tabulated in Table No. 66.

TABLE No. 66
SUPERINTENDENCE

Number of Company.	Milk Received.	Number of Employees.	Man Hours.	Quarts per Man Hour.	Cost per Quart.	
1	20,417	3	24	851	.000673	
2	16,056	4	36	446	.001290	
3	4,346	1	10	851	.001150	
4	65,800	4	40	1,645	.000477	
5						
6	8,000	4	32	250	.003179	
7-R, Av.	20,236	8	73	277	.002440	
8	43,070	1	7	6,161	.000093	
Present Rochester costs.....					.002440	Yearly Cost \$18,023.70
Rochester costs under centralized system.....					.000348	10,428.05
Savings under centralized system.....					.002092	\$7,595.65

It will be noted in Table No. 66 that company No. 8 handles 43,000 quarts daily with one superintendent; No. 4 handles 65,800 quarts daily with four superintendents. It seems a fair basis to assume that the total milk supply of Rochester of 82,075 quarts could be handled under the supervision of four superintendents working for 10 hours daily (five hours Sundays) or a period of 65 hours a week. The present Rochester wage scale is .676. With larger responsibility these men undoubtedly would have to have as much as .769 per hour, which amounts to \$50.00 per week. This would make a cost under the centralized system for superintendence of .000348 per quart, or \$10,428.05 per year.

This would result in a saving over the present charges of .002092 per quart, and \$7,595.65 per year. It must be remembered in considering these figures that superintendence is exercised at the present time over only 20,236 quarts of the Rochester milk supply, while under the centralized system this superintendence would be exercised over the entire supply of 82,075 quarts.

MISCELLANEOUS

In all of the large milk plants there are employed laborers who perform miscellaneous services. They may assist in the labor of various departments at different times, and perform odd pieces of work, such as the handling of freight, supplies, repairing, painting, cleaning, and other such services. Under this item for the City of Rochester are listed 21 employees in plants handling 17,187 quarts daily, working for a period of 69.5 man hours daily at the rate of 247 quarts per man hour, and at a cost of .001448 per quart. In some of the other companies in the list there are also employed men under this head, as shown in Table No. 67.

TABLE No. 67
MISCELLANEOUS

Number of Company.	Quarts Milk Received Daily.	Number of Employees.	Total Man Hours.	Quarts per Man Hour.	Cost per Quart.	
1	20,417	5	30.5	669	.000336	
2						
3						
4	65,800	5	49	1,342	.000257	
5						
6	8,000	3	28	285	.001000	
7-R, Av.	17,187	21	69.5	247	.001448	
8	43,070	3	19.50	2,208	.000172	
Present Rochester costs					.001448	Yearly Cost.
Rochester costs under centralized system.....					.000236	\$9,081.20
Savings under centralized system.....					.001212	7,056.18
						\$2,025.02

In Table No. 67 it will be noted that company No. 8, handling 43,070 quarts, employs only 3 men as miscellaneous workers, and that company No. 4, handling 65,800 quarts, employs only 5 such men. It seems fair to assume, therefore, that the Rochester milk supply of 82,075 quarts requires only six such men. Applying the Rochester wage scale of .358 per hour to these men, and assuming that they work nine hours each, or 54 hours daily, the total yearly cost would be \$19,332. This would make a cost per quart under the centralized system of .000236 per quart, and a

yearly cost of \$7,056.18. This shows a saving of .001212 per quart, and an annual saving of \$2,025.02. It must be remembered in considering these figures that the number of quarts of Rochester milk in the above table on which the miscellaneous labor was reported was only 17,187 quarts, and that under the centralized system the labor is applied to the entire supply.

CANVASSERS

Two of the Rochester milk companies employ canvassers. These men are used to solicit new trade. Their services constitute a part of the present competitive system. Under a centralized system where there would be no competition canvassers would not be necessary. The present cost per quart for the services of these canvassers is based on 12,836 quarts handled by the companies which employ them. This is at the rate of .001905 per quart, and a yearly cost of \$8,924.25. Under the centralized system there would be no such item of expense, and therefore the annual saving would be \$8,924.25.

OFFICERS

The 136 milk distributing companies in Rochester are all of them owned by proprietors or stock companies. In one sense, therefore, all of these companies are manned by officers. Since, however, the small dealers embody in the person of one or two men all of the functions of the business, the item of officers is limited strictly to the officers of the four large companies in Rochester which reported officers drawing salaries. This covers 23,836 quarts of the milk supplied, which is at the rate of 2,954 quarts per officer, and their salaries amount to .004893 per quart, and annually \$42,573.60. Under a centralized system, it is estimated that not more than three officers would be required at salaries amounting to not more than \$20,000.00 per year for three. This would be at the rate of .000668 per quart. Under the centralized system therefore there would be a saving of .000225 per quart, and \$22,573.60 per year. The above figures, it must be remembered, are based on the cost of officers' salaries for companies handling only 23,836 quarts of milk daily at the present time in Rochester, while under the centralized system the salaries would apply to the entire Rochester supply. The officers' salaries are tabulated in Table No. 68.

TABLE No. 68

OFFICERS

Number of Company.	Quarts Received Daily.	Number of Officers.	Quarts per Officer.	Cost per Quart Received.	
1	20,417	5		.002023	
2	16,056			.002693	
3	4,346			.002257	
4	65,800				
5	9,000	3	3,000	.005966	
6	8,000	2	4,000	.003427	
7-R, Av.	23,836	8	2,954	.004893	
8	43,070	1	43,070	.000386	
Present Rochester cost				.004893	Yearly Cost \$42,573.60
Rochester cost under centralized system.....				.000668	20,000.00
Savings under centralized system.....				.000225	\$22,573.60

ECONOMIES IN MILK DISTRIBUTION

Comparative Wage Scale

The economies suggested in the above series of tabulations will undoubtedly be criticised by some on the ground that the wage scale in the different companies is different, and this wage scale is the chief reason for the difference in costs. This possibility has not been overlooked by the Survey.

It is fully recognized that the difference in wage scales would affect the difference in costs. In the estimates made above it will be remembered, however, that the economies suggested have not been based on the cost in dollars, but on the work performed per man hour in the majority of instances. Consequently, these economies are entirely independent of the wage scale, being based on the efficiency of the work performed in the operation and not on the prices paid to the labor.

In order, however, to completely cover any question concerning the difference in wage scale, there is presented below a statement of the wages paid by four of the large milk companies of the City of Rochester and by the large milk company in the City of Ottawa, Canada. These wage scales are shown in Table No. 69.

TABLE No. 69
COMPARISON OF EMPLOYEES' PAY ROLL AND VOLUME
OF BUSINESS

	301	101	132	47	119
Number of employees on milk	113	43	53	52	8
Total weekly pay roll.....	\$2,944.00	\$1,345.00	\$1,474.00	\$1,365.00	\$254.87
Average rate per week.....	26.05	31.29	27.81	26.23	31.86
Quarts of milk per day.....	43,070	9,000	8,000	9,075	3,000

From Table No. 69 it will be noted that company No. 301, which is located in the City of Ottawa, Canada, has an average rate per week for labor of \$26.05, while company No. 47, a Rochester milk company, has approximately the same wage scale.

As a further means of comparing the wages paid by the different milk companies, the cost per man hour for performing each one of the more important milk operations has been independently determined for all of the milk companies in the list presented in the previous series of tabulations. This list includes three Baltimore milk companies, two Rochester milk companies, one Philadelphia, one Ottawa, and the average for the City of Rochester.

Those particularly interested in a comparison of these wage scales can note the cost for performing the labor of each one of the separate operations for each one of the companies mentioned. These figures are presented in Table No. 70.

TABLE No. 70
WAGE SCALES PER MAN HOUR

	1	2	3	4	5	6	7-R Av.	8
Milk receiving	.391	.304	.285	.437	.357	.535	.441	.443
Bottle washing	.390	.269	.272	.365	.349	.390	.383	.377
Can Washing	.301	.286	.275	.458	.349	.400	.382	.403
Apparatus Washing	.273	.204	.260	.385	.349	.408	.427	.308
Pasteurizing and Cooling	.407	.371	.294	.385	.365	.427	.500	.362
Cooling Only	..	..	..	..	..	..	.409	..
Bottling and Capping	.290	.302	.271	.374	.349	.390	.393	.357
Can Filling	.303	.279	..	.246	.349	.427	.398	.426
Driving Retail	.598	.603	.434	.413	.800	.543	.461	.418
Driving Wholesale	.425	.444	..	.413	.619	.450	.452	.418
Driving, Railroad to Plant.....	.330	.342	.291	.396	.803	.427	.442	.401
Stable	.206	.236	.254	.355	.328	.433	.414	.391
Garage	..	..	..	.581	..	.450	.498	.555
Engine Room	.481	.481	.337	.600	.397	.750	.448	.479
Refrigerating Plant	*	*	*	*	*	*	.455	.479
Plant Protection	.190	.214	..	.257	..	.400	.261	.208
Experimental	..	..	..	.412	..	..	..	.477
Office Force	.422	.443	.372	.534	.508	.318	.390	.379
Collectors	..	..	.476	..	.246	.420	.439	..
Superintendence	.573	.690	.500	.786	..	.794	.676	.577
Miscellaneous	.225	.376	..	.346	..	.285	.358	.381
Canvassers	..	..	..	..	.532	..	.506	..

*Combined with engine room charge.

The advantages of a centralized system as compared with the present system of doing business, so far as the labor charges are concerned, are shown in Table No. 71.

TABLE NO. 71
SUMMARY OF ESTIMATED SAVINGS IN LABOR UNDER A
CENTRALIZED SYSTEM
(Data from Previous Tables.)

OPERATION.	COST UNDER PRESENT SYSTEM.		ESTIMATED COST UNDER CENTRALIZED SYSTEM.		ESTIMATED SAVINGS.	
	Unit cost per quart sold.	Yearly cost.	Unit cost per quart sold.	Yearly cost.	Unit savings per quart sold.	Yearly savings.
Milk receiving	.000647	\$ 18,315.70	.000467	\$ 13,211.20	.000180	\$ 5,104.50
Bottle washing	.001644	46,555.75	.000626	17,730.76	.001018	28,824.99
Can washing	.000615	17,406.85	.000299	8,450.76	.000316	8,956.09
Apparatus washing	.000719	20,359.70	.000226	6,395.90	.000493	13,963.80
Pasteurizing and cooling.	.000513	14,541.60	.000096	2,723.40	.000756	21,414.05
Cooling.	.000339	9,595.85				
Bottling and capping ...	.001454	41,182.95	.000604	17,111.55	.000850	24,071.40
Can filling	.000107	3,022.20	.000073	2,059.61	.000034	962.59
Driving, retail and whole- sale routes	.010493	297,117.30	.006572	186,078.53	.003921	111,038.77
Hauling from railroad to plant	.000791	22,389.10	.000308	8,723.44	.000483	13,665.66
Stable and garage	.001436	40,661.00	.000918	26,003.00	.000518	14,658.00
Engine room and refrig- eration plant	.000717	20,319.55	.000590	16,714.08	.000127	3,605.47
Plant protection	.000054	1,522.45	.000054	1,522.45		
Experimental			.000073	2,080.00	*.000073	*2,080.00
Office force	.001492	42,263.35	.000825	23,366.75	.000667	18,896.60
Collectors	.002016	57,069.29	.001008	28,534.65	.001008	28,534.64
Superintendence	.000636	18,023.70	.000368	10,428.05	.000268	7,595.65
Miscellaneous	.000321	9,081.20	.000249	7,056.18	.000072	2,025.02
Canvassers	.000315	8,924.25			.000315	8,924.25
Officers	.001503	42,573.60	.000706	20,000.00	.000797	22,573.60
Totals	.025812	\$730,925.39	.014062	\$398,190.31	.011750	\$332,735.08 Net.

*Increase expense.

In Table No. 71 have been assembled together all of the operations performed by the milk dealers of the City of Rochester under the present system, the cost per quart and the cost per year.

Compared with this in the same table is shown the estimated cost of each of these operations per quart under the centralized system and the yearly cost.

In the last two columns are stated the total estimated savings resulting from the establishment of the centralized system. For labor alone it

is to be noted that the saving would amount to .00175 per quart, and an annual saving of \$332,735.08 for labor. This would result from the substitution of a centralized system working under such business conditions as already exist in the milk industry.

This Survey presents this figure not as a matter of guess work; but as a figure which has been arrived at from close study, and comparison with the conditions actually existing in the milk industry to-day, which can be imitated by the milk industry of the City of Rochester.

EXPENSES EXCLUSIVE OF LABOR

In attempting to secure a statement of the plant or factory charges, it was found impossible to secure exact figures through the work of the inspectors since these charges, for the main part, consisted of supplies, articles purchased, such fixed charges as taxes, interest, insurance, etc. Among the principal articles purchased were included glass bottles, milk cans, horse feed, coal, etc. For these items the main dependence was placed on bookkeepers or cost accountants.

An expert firm of cost accountants was employed who secured figures from four of the large milk dealers of the city whose books were kept in a manner which made these figures sufficiently reliable to justify a report. These figures have been assembled together and averaged in order to secure a statement of factory charges which would fairly represent the average of all of these four large companies. They have been divided into figures for the retail business and for the wholesale business. These averages are presented in Table No. 72.

TABLE NO. 72

UNIT PLANT CHARGES BASED ON COSTS OF BIG DEALERS

	Retail unit.	Wholesale unit.
FACTORY.		
Factory supplies	.000756	.000215
Light and power	.001630	.000824
Coal	.000663	.000276
Water	.000109	.000045
DELIVERY.		
Hay and grain	.004012	.000828
Blacksmithing	.000929	.000194
Repairs to rolling stock	.001065	.000222
Barn expense	.000144	.000034
Ice	.000152	.000127
Bottles	.002720	.000739
Cans	.000187	.000947
Caps	.000459	.000100
Cases	.000446	.000118
OFFICE.		
Advertising	.000558	
Printing	.000485	.000026
Carfares	.000166	
Postage	.000149	.000161
Telephone	.000227	.000135
FIXED CHARGES.		
Taxes	.000854	.000673
Insurance	.000661	.000419
Interest	.000735	.000242
Allowances	.001525	.000165
Stationery	.000419	.000254
Depreciation on—		
Buildings	.000823	.000547
Rolling stock	.001113	.000622
Machinery and equipment	.001252	.001219
Furniture and fixtures	.000082	.000041
Repairs to buildings	.001027	.000451
Accounts charged off	.000896	.000106
Sundries	.001424	.001020
Rent		.000141
Total	.025668	.012267

Item .012267 represents the unit cost of plant charges for wholesale bottled milk. Subtracting .000957 which represents bottle, caps and case charges, gives the figure .011310 which is the unit plant cost for wholesale can milk.

All of the plants of the small dealers were visited by the inspectors and many attempts made to secure a statement of the expenditures by small dealers for supplies and other expenses independent of labor costs. It was found impossible, however, to secure from these men figures of sufficient accuracy to justify an independent report. Consequently, the

figures for factory costs, excepting labor, for the entire city, have been based on the figures obtained from the four large dealers above mentioned.

Using these figures as a basis for estimate and applying them to the milk supply furnished to the city for the three classes of milk—retail bottled milk, wholesale bottled milk, and wholesale canned milk, gives the results indicated in Table No. 73.

TABLE NO. 73

ONE DAY'S TOTAL FACTORY COSTS EXCEPTING LABOR, FOR ALL MILK FIGURED ON BASIS OF BIG DEALERS' COSTS.

	Quarts.	Unit Plant Cost Per Quart Sold.	
Retail—Bottle	57305	× .025668	= \$1,470.90
Wholesale—Bottle	11386	× .012267	= 139.67
Wholesale—Can	8888	× .011310	= 100.52
			<u>\$1,711.09</u>

From Table No. 73 it appears that the daily costs of supplies and other expenses for retail bottled milk is \$1,470.90; for wholesale bottled milk, \$139.67, and for wholesale canned milk, \$100.52, making a total daily cost for the city of \$1,711.09.

POSSIBLE REDUCTIONS IN FACTORY CHARGES (EXCEPT LABOR)

Just how much the factory expenses would be reduced by centralizing the business is not easy to estimate. One must form a mental picture of the present conditions in Rochester by taking into account the fact that 136 milk dealers are engaged in buying all of the supplies for their business. The majority of these purchase supplies at retail and, consequently, at prices much higher than the prices which are paid by the very large dealers who buy at wholesale.

In addition to this it must be remembered that where there are 136 factories there is an enormous duplication so that the number of articles required is much greater; for example, where milk is bottled each factory has its own bottle filling machine. As stated in a previous part of the report, there are 25 pasteurizing machines operated in Rochester. All of the equipment necessary for the washing of bottles and cans, for the care of horses, is duplicated in these factories. Consequently in purchasing supplies these purchases are constantly duplicated.

As one method of measuring the reduction in these factories three items of expense have been selected. The first of these is heat, light and power. It is obvious that there would be great economy if all of the coal

consumed in the 136 factories were centralized in one or two large factories. The reduction in steam boilers and in power plants would be so great that one would expect a great reduction in coal consumption.

As a means of forming an estimate on this branch of the business, the present costs of light, heat and power for all of the companies in the list we have been using is presented in Table No. 74.

TABLE NO. 74
HEAT, LIGHT AND POWER

Number of Company.	Quarts per year.	Total cost per year.	Unit cost per quart.	
1	6,419,255	\$30,326	.004724	
2	5,539,240	18,829	.003399	
3	1,265,820	4,831	.003816	
4				
5	2,678,005	4,523	.001689	
6	1,754,212	5,046	.002876	
7-R, Av.	28,316,335	52,244	.001845	
8	12,364,485	23,412	.001893	
Rochester cost under present system			.001845	Yearly Cost \$52,244
Rochester cost under centralized system.....			.001500	42,474
Savings under centralized system.....			.000345	\$ 9,770

In Table No. 74 it appears that Rochester is now spending \$52,244 yearly for light, heat and power, at the rate of .001845 per quart. One company in the list is doing this same thing at an expense of .001689 per quart. There is no doubt that, as a result of centralization, the reduction would be considerably greater than the difference shown between these two figures.

In order, however, to be conservative, we have assumed that under a centralized system, by abolishing the numerous plants now existing in Rochester, and burning coal only in one or more centralized plants, this could be done at the rate of .001500 per quart. This would amount to \$42,474 yearly, and result in a saving of .000345 per quart and \$9,770.00 per year.

HORSE FEED AND BEDDING

The cost of horse feed and bedding was obtained from six of the companies in the list and for the entire City of Rochester. The figures show that there are 228 horses working on the milk wagons delivering milk in the City of Rochester, and that the feed costs \$59,711.00 per year, which is at the rate of \$261.89 per horse.

In Table No. 59, on the subject of milk wagons and milk delivery, it is shown that Rochester milk could be delivered with a total of 139

delivery wagons. This included automobiles. If the same proportion of automobiles now used, which is 7, should be used under a centralized system, there would be about 38 needed under such system.

This would mean 101 vehicles drawn by horses and 38 by motor power.

Under these circumstances, it is estimated that not more than 140 horses would be required to supply horse power for the one-horse and two-horse vehicles used under a centralized system.

Assuming that the cost of horse feed per year for these horses would be the same as the present cost, which is \$261.89, the total yearly cost for feeding 140 horses would be \$36,664.60. This would result in an annual saving of \$23,046.40, on the item of horse feed. These figures are presented in Table No. 75.

TABLE NO. 75
HORSE FEED AND BEDDING

Number of Company.	Number of horses.	Cost of hay and grain per year.	Cost per horse per year.	
1	82	\$24,180.72	\$294.89	
2	63	22,205.20	362.46	
3	25	9,954.52	398.18	
4				
5	26	7,622.09	293.16	
6	29	6,688.22	230.62	
7-R, Av.	228	59,711.00	261.89	
8	125	31,125.93	249.00	
Present Rochester cost				Yearly Cost \$59,711.00
*Rochester cost under centralized system				36,664.60
Savings under centralized system				\$23,046.40

*(Assuming 140 horses.)

LOSS ON BOTTLES

One of the most important items of expense and one which has received more popular attention perhaps than any other item in the milk business is the loss on bottles. It is commonly believed by the average citizen that the loss on milk bottles ranges somewhere between two and five cents per quart. The actual cost of milk bottles at the present time is \$8.00 per gross for quarts and \$6.75 per gross for pints. This means a cost per quart of .0555 per quart bottle, or a little more than 5½ cents.

It is undoubtedly true that many bottles are broken and lost, and unnecessarily so, and that a considerable saving in expense would result

if these losses were reduced. The actual condition of affairs in the City of Rochester has been determined by summarizing the amount of money paid yearly for new glass bottles by the Rochester companies which keep such accounts and applying this same item of expense at the same rate to those Rochester companies which do not keep accounts. This method of estimate it is believed is entirely fair for the reason that the smaller milk dealers who do not keep accounts undoubtedly sustain greater losses on milk bottles and are put to a greater expense in the purchase of milk bottles at retail than are the larger milk dealers.

The total number of milk bottles handled by the City of Rochester each day, including quarts, pints and half pints, is 83,503, and annually this amounts to 30,478,595. The total number of bottles purchased by all of the dealers in Rochester annually is 1,332,432. At this rate each glass bottle in Rochester makes 22.8 trips before it is broken or lost. The expense of replacing these broken and lost bottles must be paid for by each quart of milk sold, and amounts to .002720 per quart under present conditions. This is an annual expense on bottles for the entire city of \$68,196.

Similar figures have been obtained from all of the other companies in the list and are presented in Table No. 76.

TABLE NO. 76
LOSS ON BOTTLES

Number of Company	Daily bottles sold.	Yearly bottles sold.	Yearly bottles purchased.	Trips per bottle.	Cost per quart of milk sold.	Yearly expenditure for bottles.
1	15,229	5,558,585	455,760	12.2	.004196	\$23,325
2	13,540	4,942,100	442,684	11.1	.004584	22,657
3	4,650	1,697,250	106,560	15.9	.003213	5,454
4	72,000					
5	7,690	2,806,850	100,454	34.8	.002645	5,142
6	8,320	3,036,800	82,252	36.9	.002805	4,210
7-R, Av.	83,503	30,478,595	1,332,432	22.8	.002720	68,196
8	46,034	16,802,410	391,219	42.9	.002024	20,023
Present Rochester costs					.002720	68,196
Rochester costs under centralized system					.001377	38,997
* Savings under centralized system					.001343	\$29,199

From Table No. 76 it appears that the number of trips made by the glass bottles of Rochester before they are broken or lost is greater than the number of trips made by bottles from companies Nos. 1, 2 and 3. On the other hand, company No. 8 handles its business in a manner which

results in its bottles making nearly 43 trips before they are broken or lost. Figures obtained from company No. 8 for the month of August showed that during that month the glass bottles of that company made 51 trips before they were lost or broken.

Under a centralized system, where there is no competition and where all of the bottles are of the same type and stamped with the same name, and collected and delivered by the same wagons, the loss on bottles would be reduced to its lowest terms. If milk consumers co-operated to reduce these losses, the life of the milk bottle would be greatly increased:

Forty trips would seem to be a fair estimate for the bottles of the City of Rochester under a centralized system. This would mean an expense per quart of milk sold of only .001377, and an annual cost for glass bottles of \$38,997. The savings under the centralized system would be therefore .001343 per quart, and \$29,199 per year.

Taking the average reduction in cost on savings resulting from the centralized system on the items of heat, light and power, horse feed and bedding, and loss on bottles, the figures show a percentage reduction of 34.4 per cent.

For purposes of comparison the same items of factory expense were obtained from milk companies in the cities of Ottawa, Canada, and Baltimore, Md.

Company No. 8, located in Ottawa, Can., finds that the cost of factory supplies is, in many instances, higher even than the figure of the United States. It is lower, however, on horse feed. It seems fair to assume, therefore, instead of a reduction of 50 per cent., a reduction of about 34 per cent., as indicated by the three largest factory cost items above mentioned, should be made. Applying this percentage to the entire factory costs of Rochester under the present system would result in a cost under a centralized system of \$409,572, which is at the rate of .014464 per quart. This would result in the saving, under the centralized system, in factory expenses, of \$214,975.85, which is at the rate of .007592 per quart, as shown in Table No. 77.

TABLE No. 77
TOTAL FACTORY EXPENSES (EXCEPT LABOR)

Company Number	Quarts Sold Per Year.	Total Yearly Costs.	Total Daily Factory Costs Except Labor.	Unit Cost per Quart Sold.	
1	6,419,255	\$179,672.00	\$ 492.25	.027989	
2	5,539,240	178,785.00	489.82	.032276	
3	1,265,820	65,952.00	180.69	.052102	
4					
5	2,678,005	55,653.33	152.47	.020781	
6	1,754,212	52,976.13	145.14	.030199	
7-R, Av.	28,316,335	624,347.85	1,711.09	.022056	
8	2,364,485	129,652.20	355.21	.010485	
Present Rochester costs				.022056	Yearly Costs \$624,547.85
Rochester cost under Centralized System.....				.014464	409,572.00
Savings under Centralized System.....				.007592	\$214,975.85

In Table No. 78 it is to be noted that under the present system the total expenses outside of labor for the operation of the milk factories of Rochester amount to .022 per quart, or \$624,548.00 per year, while under a centralized system these costs would be only .0144 per quart, or \$409,572.00 yearly. Centralization reduces these expenses so that there would be an annual saving amounting to .007592 per quart and \$214,976.00 yearly.

TABLE No. 78
SUMMARY OF ESTIMATED SAVINGS IN PLANT CHARGES
UNDER A CENTRALIZED SYSTEM

COST ITEMS.	UNDER PRESENT SYSTEM		ESTIMATED UNDER CENTRALIZED SYSTEM		ESTIMATED SAVINGS	
	Unit Cost per Quart Sold.	Total Yearly Cost.	Unit Cost per Quart Sold.	Total Yearly Cost.	Unit Savings Per Quart.	Total Yearly Savings.
Horse feed and bedding..	.002109	\$59,711	.001295	\$36,655	.000814	\$23,046
Bottles	.002408	68,196	.001377	38,997	.001031	29,199
Heat, light and power....	.001845	52,244	.001500	42,474	.000345	9,770
All other expenses (except labor).....	.015694	444,397	.010292	291,436	.005402	152,961
Totals.....	.022056	\$624,548	.014464	\$409,572	.007592	\$214,976

FREIGHT

The milk supply of the City of Rochester comes into the city through four channels:

24,985 by motor truck.

3,018 by wagon.

48,163 by railroad.

5,909 by trolley.

The milk which comes by truck, wagon and railroad is paid for by cwt. The milk which comes by trolley is paid for by the quart. The entire cost of freight per day and per year is shown in Table No. 79.

TABLE No. 79

COST OF TRANSPORTING MILK FOR THE CITY OF ROCHESTER

	Quarts	Cwt.	Rate	Total Daily Cost
Motor truck	24,985	531.5	30c cwt.	\$159.45
Wagon.	3,018	64.2	30c cwt.	19.26
Railroad	48,163	1,025	24c cwt.	246.00
Trolley	5,909		½c qt.	29.55
	82,075			\$454.26
Cost per year.....			\$165,805	
Unit cost per quart.....			.005534	

Estimated saving in freight under a centralized system at 10% is \$16,580.50.

In Table No. 79 it appears that the yearly cost of freight is \$165,805; the cost per quart is an average of a little over 5½ cents.

Under the present system there is no way whereby the cost of this freight can be reduced. Under a centralized system, on the other hand, the milk would be shipped from the country to the city to one distributor instead of to 136 distributors as under the present system. The shipping of the milk from the country to one city distributor would make possible a rearrangement of the channels of shipment in several respects, that is, the milk which comes by motor truck would be centralized so that each motor truck would carry as nearly as possible a full load, and the total number of motor trucks would be reduced. The milk which comes by wagon in the same way would be centralized so as to provide full wagon loads. The milk which comes by railroad, instead of being subdivided into separate lots for the different shippers and different distributors, would all belong to the same lot and therefore could be packed in carloads, some of which might constitute entire carload shipments and secure the freight reduction which the railroads grant to full cars. The milk which is shipped by trolley in the same manner, instead of being shipped

in separate lots, would all be shipped to the same distributor and land at the same receiving station. These changes, all of them, would result in economies in the labor connected with the loading and unloading of the milk, and would, without question, reduce the work of the railroads and trolleys and the work of the trucks and wagons.

It is difficult to estimate accurately just what this reduction would be. The experience of large milk companies in other cities in the reduction of freight rates would indicate a possible reduction of 10 per cent. in the cost of freight in large lots over the cost of handling milk in small lots. It is believed that the reduction would be greater than this but, for the purposes of this survey, an allowance of only 10 per cent. in the cost of freight will be made. This amounts to a total of \$16,580.50.

LOSS ON SURPLUS

One of the items which is commonly overlooked by persons not familiar with the milk industry is the loss on surplus milk. Contracts between milk producers as a rule provide that the distributor shall accept all of the milk which the producers furnish. There is no constant relationship between the supply and the demand. At certain times of the year, especially in the spring months when cows are put out on pasture, there is as a rule a production of milk far in excess of the market demands. In some years, during the months of May and June, this surplus exceeds the market demands by as much as 80 per cent. As a rule, during the months of July and August, when the hot weather dries up the grass and flies are numerous, there is a shrinkage in the production of milk by dairy cows, which results in an actual deficiency, so that the quantity of milk produced by the regular milk producers supplying the milk dealers of Rochester and other cities is less than the market demands. This deficiency is made up, if possible by bringing into the city market milk from outside source of supply, such as butter factories, cheese factories, condensed milk factories, etc.

The successful milk dealer is compelled to arrange his business so that such deficiencies, if possible, will not occur. This means that, for most of the months of the year, the dealer is compelled to carry a surplus of milk in excess of market demands which ranges annually from 5 to 20 per cent. of his total business. This surplus milk cannot be marketed at the flat price of fluid milk, but must be made up into milk products such as condensed milk, butter, cheese, powdered milk, buttermilk, cream, etc. The market price for these milk products as a rule brings in to the dealer less money than he would receive if the surplus milk could be sold at full fluid milk prices. Consequently, in every milk company there is an annual loss of money due to the manufacture and sale of surplus milk. In most large cities this loss is estimated at about $\frac{1}{2}$ cent per quart.

The figures obtained from the City of Rochester from the four large milk companies whose accounts show losses on surplus have been applied to the entire milk supply of the city. It is believed that such an estimate of the annual Rochester loss on surplus is a fair one since the smaller milk dealers as a rule sustain greater losses on surplus milk than do the large milk dealers, for the reason that the small dealer is not equipped with facilities for manufacturing his surplus milk to advantage. Consequently, any estimate based on the loss on surplus of the large dealers is more conservative than it is believed the actual losses of the small dealers really are.

On this basis figures for Rochester, together with the figures taken from the other milk companies in the list, are presented in Table No. 80.

TABLE No. 80
LOSS ON SURPLUS

Number of Company.	Daily Milk Received.	Daily Loss.	Loss per Quart.	Yearly Loss on Milk Sold.
1	20,417	\$ 79.18	.004433	\$ 28,899
2	16,056	109.83	.007237	40,091
3	4,346	29.76	.008581	10,862
4	65,800	295.00	.00500	107,675
5	8,000	19.47	.004051	7,106
6	82,075	328.70	.004237	119,976
7-R, Av.	43,070	117.98	.00310	43,064
8				
Present Rochester costs.....			.004237	\$119,976
Rochester costs under centralized system.....			.003500	99,118
Savings under centralized system.....			.000737	\$20,858

From Table No. 80 it appears that the loss per quart on the entire milk supply of Rochester is .004237, and the annual loss \$119,976. Some of the milk companies in the list sustain greater losses than others. Company No. 4 is rated at .005 per quart on a basis of estimates made by the Food Administrator of Philadelphia, whose allowance for all milk dealers in that city for losses on surplus is $\frac{1}{2}$ cent per quart.

Company No. 8 is possessed of unusual facilities for the manufacture and marketing of surplus milk, not only because its business is centralized, but because it is connected with a large ice cream business. It is believed that under a centralized system in Rochester similar advantages could be obtained and therefore that it would be justifiable to assume that the loss on surplus in Rochester could be greatly reduced. With such a plan in

mind, the figure .003500 is suggested as a fair basis for the loss on surplus for Rochester under a centralized system. This would mean an annual loss of \$99,118 under a centralized system, a saving of .000737 per quart, and an annual saving of \$20,858.

Having now shown in detail the possible savings in labor, factory expenses, loss on surplus, and freight, these items can be assembled together to show the total possible savings under a centralized system. This summary appears in Table No. 81.

TABLE No. 81
FINAL SUMMARY OF ESTIMATED SAVINGS UNDER
CENTRALIZED SYSTEM

	UNDER PRESENT SYSTEM		ESTIMATED UNDER CENTRALIZED SYSTEM		ESTIMATED SAVINGS	
	Unit Cost per Quart Sold.	Total Yearly Costs.	Unit Cost per Quart Sold.	Total Yearly Costs.	Unit Savings per Quart Sold.	Total Yearly Savings.
Freight or trucking....	.005855	\$165,805	.005270	\$149,225	.000585	\$16,580
Labor (Table No. 71) ..	.025812	730,925	.014062	398,190	.011750	332,735
Factory, other than labor (Table No. 77)....	.022056	624,548	.014464	409,572	.007592	214,976
Loss on Surplus.....	.004237	119,976	.003500	99,118	.000737	20,858
Totals.....	.057960	\$1,641,254	.037296	\$1,056,105	.020664	\$585,149

From Table No. 81 it appears that the total cost of selling milk in the City of Rochester under the present system is .0579 per quart, amounting to a yearly cost of \$1,641,254, while under the centralized system the cost would be .0372 per quart, or \$1,056,105 per year. Under the centralized system the savings therefore would be .02 per quart, and \$585,149 per year.

MILK SALES

The sale of milk by the City of Rochester at the prices charged by each class of dealers has been assembled in the form of a tabulation with the object of showing the prices charged by dealers handling under 500 quarts, dealers handling from 501 to 1,000 quarts, and from 1,000 quarts and upwards.

It is commonly believed that the small dealers charge less money for milk than the large dealers. The daily sales of milk for each of these groups of dealers and for each class of milk, including retail bottled milk, wholesale bottled milk, and wholesale canned milk, have been put together and presented in Table No. 82.

TABLE No. 82
TOTAL MILK SALES FOR ONE DAY CITY OF ROCHESTER

DEALERS RECEIVING	RETAIL BOTTLED			WHOLESALE BOTTLED			WHOLESALE CAN			TOTAL FOR CITY		
	Quarts.	Price.	Value.	Quarts.	Price.	Value.	Quarts.	Price.	Value.	Quarts.	Average Price.	Value.
Under 501 quarts.....	22,402	.13348	\$2,990.22	3,838	.11196	\$429.70	1,176	.09387	\$110.39	27,416	.12876	\$3,530.31
501 to 1,000.....	11,912	.13347	1,589.89	2,964	.11325	335.67	299	.10719	32.05	15,175	.12900	1,957.61
1,001 and upwards.....	22,991	.13823	3,178.05	4,584	.11345	520.05	7,413	.11000	815.43	34,988	.12900	4,513.53
Total.....	57,305	.13538	\$7,758.16	11,386	.11289	\$1,285.42	8,888	.10777	\$957.87	77,579	.12892	\$10,001.45

In Table No. 82 it appears that the small dealer selling under 501 quarts charged an average price for retail bottled milk at the time these figures were obtained (in the month of August) of .13348, while dealers selling from 501 to 1,000 quarts charged a trifle less. Dealers selling from 1,000 quarts upwards charged the most.

For wholesale milk in bottles the small dealers charged slightly less than the other dealers, while for wholesale canned milk they charged as much as one cent less than the dealers in the next class, and almost two cents less than the large dealers. In examining these figures, however, it must be borne in mind that the large dealers are pasteurizing milk and that this adds to their cost. It is also true that the large dealers make greater expenditures for the washing and sterilization, refrigeration and other items of expense connected with the care of milk than is done by the small dealers.

In the last part of this tabulation will be noted the total selling prices for the entire City of Rochester average and the total value of the milk sold each day, which amounts to \$10,001.45. This means that the milk sold by the City of Rochester at these prices would bring in an income annually of \$3,650,529.25.

XI

SUMMARY OF MONEY INVESTED IN THE BUSINESS OF MILK DISTRIBUTION BY ROCHESTER MILK DEALERS

In order to arrive at a fair statement of the money invested in the milk business of Rochester, the dealers have been divided into groups, according to the size of their business. The dealers operating pasteurizing machines have been grouped separately for the reason that their investment includes a much larger item for machinery, because the pasteurizers, which form the most important part of their equipment, are not included in the equipment of the other dealers.

Every one of the 25 dealers operating pasteurizers was visited by the Inspectors of the Survey, and through conference with them, an estimate was made of the value of their land, buildings, machinery and delivery equipment. In addition to this, nine of the smaller dealers, handling raw milk, were visited, and similar estimates formed of the value of the land, buildings, machinery and delivery equipment owned by them. The figures obtained from the dealers visited in this way were used as a basis for estimating the value of the land, buildings, machinery and equipment owned by the remainder of the small milk dealers.

Values were pro-rated in accordance with the number of quarts handled by each dealer. The figures obtained in this way are presented in Table No. 83.

TABLE NO. 83

SUMMARY OF INVESTMENT OF ROCHESTER MILK DEALERS

	WITH PASTEUR- IZERS.	WITHOUT PASTEURIZERS.				Grand Total.
	Investment reported.	INVESTMENT NOT REPORTED.				
		400 quarts or less.	Over 400 quarts.	Total.		
Number of Dairies	25	9	83	19	111	136
Milk received (quarts)	47,373	3,338	21,071	10,243	34,702	82,075
Land	\$ 69,568	\$ 4,250	\$ 31,164	\$ 10,376	\$ 45,790	\$115,358
Buildings	237,646	8,100	40,815	25,710	74,625	312,271
Machinery	196,336	4,390	30,490	11,278	46,158	242,494
Delivery	104,535	7,500	34,009	25,485	66,994	171,529
Totals	\$608,085	\$24,240	\$136,478	\$72,849	\$233,567	\$841,652

In Table No. 83 the column of figures for the 25 dealers operating pasteurizers are actual statements of costs, made by the dealers themselves, with one exception.

cost of milk purchased from the farmer has been added to the other costs in the list.

The price paid to the producer for milk during the month of August when these figures were obtained was .072551. Adding this price to the other items of expense for each class of milk sold in Rochester, including retail bottled milk, wholesale bottled milk and wholesale canned milk, the entire cost of handling Rochester milk is obtained. The selling price and the profit and loss are shown in Table No. 85.

TABLE NO. 85
TOTAL COST PER QUART (THREE CLASSES) OF ROCHESTER MILK,
AUGUST, 1919

EXPENSE ITEMS.	Retail bottled.	Wholesale bottled.	Wholesale can.
Cost of fluid milk	.072551	.072551	.072551
Freight	.005534	.005534	.005534
Loss on surplus	.004237	.004237	.004237
Labor charges	.028149	.021572	.018711
Factory expense	.025668	.012267	.011310
Total	.136139	.116161	.112343
Selling price	.135380	.112890	.107770
Loss	.000759	.003271	.004573

From Table No. 85 it appears that during the month of August there was an actual loss on all three classes of milk sold by all dealers in the City of Rochester. While these losses were slight, yet they constitute convincing evidence that, under present conditions, the conduct of the business in Rochester at the prices stated was not profitable.

It must be borne in mind that the month of August is what is known as a short month; that is to say, due to the vacation period, the quantity of milk sold in Rochester is less than the normal quantity demanded by the city. It has been stated that the volume of milk required by the city averages at least 10 per cent. more than the volume of milk sold in August. If this is so, such an increase in volume would wipe out the losses noted in the above table and would enable the milk dealers to make a moderate profit during some months of the year. This could only be accomplished, however, through an increase in the retail price and provided the price paid to the producer did not correspondingly increase.

The report of the expert cost accountants who examined the cost accounts of four of the large dealers in Rochester for the business transacted during the year ending December 31, 1918, shows that one distributor made an annual profit of \$3,824.43; another an annual loss of \$19,374.93; another a profit of \$3,147.92; and another a loss of \$2,156.30.

These profits and losses are based exclusively on the business of buying and selling fluid milk, and do not include the business of buying and selling cream. It is believed that in some of the companies mentioned the business of buying and selling cream brings in larger profits than the fluid milk business. The profits and losses above mentioned are additional evidence that at present prices under the existing competitive system the fluid milk business does not produce large profits.

CONTROL OF MILK SUPPLY BY ROCHESTER HEALTH DEPARTMENT

The City of Rochester has no milk regulations of its own. In the fall of the year 1914, the New York State Public Health Council at Albany published a Sanitary Code containing a chapter on Milk and Cream.

Regarding enforcement of these regulations, the Code states in regulation 15, as follows:

"Regulation 15. When to take effect. Every regulation in this chapter, unless otherwise specifically stated, shall take effect throughout the State of New York, except the City of New York, on the 16th day of November, 1914."

This means that these regulations shall apply to every city and town and village in the State of New York.

Review of the character of the regulations contained in the report makes it very clear that every grade of milk, both raw and pasteurized, existing in the State of New York, in towns and villages as well as in cities, is recognized and perpetuated by this report. In short, the State authorities, in issuing these regulations, did so with the full knowledge that the same must be adapted to and available for country villages as well as for cities.

A special provision is made in the regulations on behalf of first-class cities and other municipalities which may desire to safeguard their milk supplies by more modern methods than those provided for in the regulations, which is in these words:

"Regulation 14. Supplementary regulations of local authorities. The health authorities of any municipality may, in their discretion, increase the stringency of these regulations, or add to them in any way not inconsistent with the provisions thereof."

This means that Rochester, or any other city, may adopt milk regulations of their own, provided these are not inconsistent with the minimum requirements of the State regulations.

From the reports published by the Bureau of Health of the City of Rochester during the past ten years, a tabulation has been drawn up showing the work performed. Reports are incomplete and therefore the tabulation is lacking in several important points. There is no complete report published later than the year 1917.

The figures reported are shown in Table No. 86.

TABLE NO. 86
CONTROL OF ROCHESTER MILK SUPPLY BY HEALTH DEPARTMENT

Year.	Number of dairy farms.	Number of dis-tributer's licenses.	Number of milk inspectors.	Number of laboratory workers.	Number of farms inspected.	Number county milk stations inspected.	Bacteria samples collected.	Milk samples collected.	Sediment test.	Bacterial counts	(Analyzed.)		Cow stables. (city.)	Country milk rooms.	City milk rooms.	Cream tested.
											Fats, solids, analysis.	Fat (only.)				
1908	..	175	2	2	928	..	1015	3346	..	415,572	76	3281	17	888	457	50
1909	..	..	..	..	..	..	1082	2307	..	446,099	..	..	..	..	..	..
1910	..	185	2	2	772	..	1100	2588	18	354,565	37	2414	2	687	179	42
1911	..	196	3	2	2619	..	1024	1835	..	675,556	195	2683	4	95	240	52
1912	..	204	3	2	2742	..	1092	2323	1400	661,852	180	1879	..	..	407	30
1913	..	223	3	2	2197	..	1152	2062	911	609,264	161	2339	..	..	375	6
1914	700	225	3	2	2449	..	1584	2260	300	624,215	138	1866	..	..	427	12
1915	..	220	3	2	3088	..	1196	2348	..	232,122	2270	..	..	..	385	..
1916	..	202	3	2	2169	97	1164	2647	..	332,366	1776	..	..	..	372	..
1917	..	158	..	2	2347	33	..	..	432	428,519	1713	..	..	..	381	..
1918	..	140	..	..	..	..	..	1944	..	907,604	..	..	..	..	..	..

Number of City Plants Inspected, included in Sanitary Inspector's report; not sub-divided.

In Table No. 86 the statement is made that in the year 1917 the Department was equipped with seven milk inspectors. In the personnel of the Health Bureau in the report for 1917 are given the names of the chief milk inspectors, one meat and assistant milk inspector, and five assistant sanitary milk inspectors. These are in addition to the names of the biologist and chemist. Whether this means all occupied the same positions at the same time or replaced each other does not appear in the report.

Dr. George W. Goler, Health Officer, in his testimony at a public hearing held in the City Hall, on July 16th, made the following statement regarding the control of the milk supply by the Rochester Health Department:

"In the early days, in the shipped milk as well as in the made milk, we were, of course, drinking vast quantities of manure in our milk.

"As far as we could, we inspected the dairies of the men who were making the milk. We went into the country and inspected their dairies. We could not do very much because we never had more than two and a half men to protect our milk supply.

"A few years later we had difficulty because, very unfortunately, a man was called to the police court bench, who was a law unto himself, who dismissed milk cases just as rapidly as we brought them before him, and who seemed to think he was the defender of all the bad milk men in town. He was re-elected for eight years and we were practically unable to get a conviction, no matter what the man's offense might be against the milk ordinances of the City of Rochester.

"There was a notorious individual who was a typhoid carrier and who had it in his family, who was responsible for twelve cases of typhoid, three or four of which died. We were unable, through the police at that time, to either keep that man from peddling milk in Rochester or to get him arrested for selling milk in Rochester, and as the result of that we had thirteen cases and three or four deaths.

"We had still another example of just that sort of thing. A woman who had typhoid was selling milk in an establishment where she had someone sick with typhoid and we could not prevent at that time that person from coming into Rochester with milk. That would not be so now or that would not have been so a few years past. It was so then.

"Then there was a period along about 1905 when we attempted to show that there was a very considerable number of cattle furnishing milk to Rochester which were infected by tuberculosis. That is, I do not mean by that that we were interested in the cattle infected by tuberculosis in a mild degree. That was not our interest. We were interested in some of the cattle that were infected with tuberculosis which we know as open

infections; that is, infection of the intestinal tract or respiratory tract, so that organisms from the cow, either from the intestinal end—which is the more frequent line of communication between the milk and home—or the respiratory end, might get into the milk; so we instituted our new guinea pig test. We had numbers of animals and we took milk from the different herds in the country and injected these animals. When we found any of the animals afflicted with tuberculosis, we had a physical examination made of the herd. That physical examination together with the animal test, was a sufficient test to determine a very considerable number of herds of cattle that were profoundly tuberculous. Twenty per cent. of all the cattle we tested were found to be tuberculous. We were getting on swimmingly. Volunteers were coming forward to have their cows tested. Then we came to a standstill because of the large milk companies and the objection the large milk companies made was, in substance, that we were interfering with their business and it did not pay to do this work. They had no interest in children. They were simply interested in business. We had to stop. I think we had several hundred cattle killed that were profoundly tuberculous. We had certificates coming in to us from veterinary surgeons certifying to the fact that a herd of forty or fifty or seventy or eighty cows is absolutely free from tuberculosis, and we tested out the herd and found twenty of them were profoundly tuberculous. We very clearly understand that you cannot have absolutely clean milk. You do not get absolutely clean milk when you get certified milk. You do not get absolutely disease free meat unless you want to pay five dollars a pound for it, and you cannot afford to pay that. You want relatively clean milk and you want relatively disease free meat.

“In reference to this work, there is still another factor I want to speak of. That is the attitude of the milk commission. The milk commission, as I have said before, has interfered with our work more than all the milk men.”

Q. What milk commission?

A. I mean the Monroe County Milk Commission, the certified milk commission. When we organized the Milk Commission, we assumed that a large part of the work of the Milk Commission was going to be such as would raise the character of all the milk in Rochester instead of trying to improve a few two or three hundred quarts of milk from what it was in the earlier days for the benefit of people who can afford to pay for it. What did they do? They improved the quality of a few hundred quarts of milk and then turned the work over to the large companies, and through the large companies they gave to the people of Rochester the idea that being the product of the large companies, it was equivalent to certified milk, and it wasn't.

Q. In regard to the matter of tubercular inspections; I understood you to say that you were stopped by the milk dealers?

A. Yes, sir.

Q. Tell us how they stopped it?

A. I would rather tell you from the record and submit the letters to you.

Q. You have the letters, a complete record of that blocking?

A. Yes, sir.

Q. That is available so you can bring it in on short notice?

A. I don't know how short. I can bring it in to you to-morrow.

Q. We had before us the matter of the big dealers compelling you to discontinue the tubercular test. I understood you to testify that you could show how they did it by your records. Are you ready to proceed with that? Give us the history of it.

A. I could not do that because I don't know it. In giving you what I have, I am dealing with one company; there were two companies, but one company was just as bad as the other.

Q. Well, you discontinued the tubercular test because you were compelled to?

A. Yes.

Q. You know what compelled you to?

A. I am ready to tell you.

Q. That is what we want to know.

A. There is no question about the power of the Health Officer. That has been passed upon by more than one corporation counsel. In the latter part of the year 1909, down to the fore part of 1910, we began to test out all the herds; tried to test all the herds supplying Rochester with milk by what was known as the physiological test, using guinea pigs. We had then—1909—we had up to the time we discontinued our tests, tested the supply of 41 retailers and offered by 28 producers. Seven hundred and fifty-seven cattle were tested, and 671 actually were tested through the efforts of the Chief Milk Inspector. Two hundred because the owners asked for the test. And out of the total number tested, 210 cattle were killed. Thus, out of approximately 8,000 cattle supplying Rochester with milk, more than 20 per cent. of them were tested as the result of this work, and as a result of the test, approximately 12 per cent. re-acted and were killed. At that time Mr. Owen was Commissioner of Public Safety and under date of April 9, 1910, I made a report to him. I said in that letter:

"We have prosecuted our preliminary work against tuberculosis in milch cattle for a little more than a year. Of the 8,000 cows from 700 farms we have had tested more than 1,000 cows, and had 124 killed. In one herd where the evidence

was obtained through the guinea pig test, 52 re-acted out of 100, and 26 of them were so badly affected by tuberculosis that they had to be tanked for phosphate.

"One of the excellent outcomes of this work has been the voluntary requests for the testing of herds by men whom the milk inspector has visited. The applications for tests have not all been voluntary, but have been due largely to the presentation of facts to the owners by the milk inspector. In one of the herds recently picked up by Mr. Marshall, the whole herd of 21 cows re-acted.

"The above are some of the facts that I will present to the people of the City of Lawrence, Mass., on Monday evening next."

The herd referred to having 21 cows which re-acted to the test I referred to this morning. That herd we had a certificate from a veterinarian stating that the cattle were all in good condition. In the early part of the same year, after we had tested a number of cattle from the producers and reported the fact to the producers as well as to the distributors, we came to the Big Elm Dairy Co., and we tested a sample of milk from them in the usual way by injecting the sample into guinea pigs, using two pigs, the animals both re-acting. I served upon them a notice requiring them to have their producers submit their cattle to the State tubercular test under the auspices of the State who were then making tubercular tests. They objected to my decision and appealed to the Commissioner of Public Safety. I said at that time in my letter, quoted under date of July 8th, 1910, to the Big Elm Dairy Co.:

"Gentlemen:—

Those of your producers who do not comply with my direction in the matter of a State tubercular test will have their milk excluded from Rochester after January —, 1910."

"They made an appeal:

(Reading from letter on page 470 of letter book, dated June 28, 1910, from Health Officer Goler to the Commissioner of Public Safety.)

"Sir:—

"At 9:30 this morning I received a telephonic notice from Mr. Hughes that the hearing in the matter of the Big Elm Dairy Company had been postponed from the date set by you, Wednesday, to Friday, and perhaps next week.

"Shortly after the Big Elm Dairy Company was found selling milk from tuberculous cattle I exhibited to you and to His Honor the Mayor, the animal which was infected from its milk.

"My object in writing this letter is that you may know that I believe the Big Elm Dairy Company is striving to gain time, and that in doing so it may still further infect the children of Rochester with tuberculosis, and that it is further seeking to gain time so that its producers with tuberculous cattle may swap cattle or get rid of them, and thus help to bring any State test that may be made into ill repute.

"I object to the delay in the hearing in this matter because it will work further harm in raising the question among men whose cattle are found tuberculous by the tests we are making; as to whether they should not resort to the same

methods of trickery that this company always resorts to in cases where the question of the better conservation of the milk supply arises in this city.

"We have proven that in similar tests of 1,665 of the 8,000 cattle furnishing Rochester with milk, 19% re-acted and were slaughtered. Some were so badly infected with tuberculosis that they had to be tanked for phosphate and we have proven the Big Elm Dairy Company to be selling milk from some cattle fit for fertilizer, but not fit to furnish milk for our babies.

"Respectfully submitted,

"G. W. GOLER,

"Health Officer."

(Letter of direction to Dr. Goler from Commissioner Charles H. Owen, dated July 8th, 1910.)

"G. W. Goler, M. D., Health Officer.

"Dear Sir:—

"Relative to the appeal of the Big Elm Dairy Company of this city from your order of June 20th, upon which decision was rendered by me this day, would request that your bureau procure samples of milk from every producer shipping their product to this city whose herds have not been subjected to the tuberculin test, or application for test filed with the State Commission, and that the samples of these various producers as soon as practicable, be subjected to the guinea pig test for the detection of tuberculosis.

"After making these tests, any of the herds which, you believe to be infected with tuberculosis, I desire that you report the same to this office and I will immediately notify the State Commission of Agriculture of your findings, and request that they make a tuberculin test without waiting for the owners of the herds to formally sign an application for such inspection.

"I am of the opinion that eventually all milk shipped into this city should be tuberculin tested, and this Department is at the present time considering the issuing of an order making it obligatory upon the part of all milk producers shipping milk into this city to have their herds tuberculin tested. I realize that such an undertaking will require some months' time, and, after further consultation, this Department will probably set some future date, after which all milk will be excluded from the City of Rochester which has not been tuberculin tested.

"Very truly yours,

"CHARLES S. OWEN,

"Commissioner of Public Safety."

Nearly ten years ago and no order has been issued.

(Letter of Dr. Goler from Commissioner Owen, dated July 8th, 1910.)

"In the matter of the appeal of the Big Elm Dairy Company, Rochester, N. Y., from the following order of the Health Officer:

June 20, 1910.

'Big Elm Dairy Company,

'Gentlemen:—

"Those of your producers who do not comply with my direction in the matter of a State tuberculin test, will have their milk excluded from Rochester after Monday, June 27, 1910.

'(Signed.)

G. W. GOLER,

'Health Officer.'

"As provided by the Charter of the City of Rochester, a public hearing was held in the office of the Commissioner of Public Safety on the above appeal, Friday, July 1, 1910. The Big Elm Dairy Company appeared by its President, Mr. A. E. Wood and by counsel.

"By the testimony of Inspector Brownell of the Health Bureau, it was shown that on or about April 7th, 1910, acting under instructions of the Health Officer, he procured a sample of cream and a sample of milk from the separator operated by the Big Elm Dairy Company at their plant on Exchange Street in this city. After passing these samples through the laboratory of the Health Bureau, they were subjected to the guinea pig test used by the Health Bureau for detecting tuberculosis in cattle. The result of the test was positive and was the basis for the order made by the Health Officer, which is now appealed from.

"By the testimony of two witnesses under oath, it was shown that the milk being run through the Big Elm Dairy Company's separator at the time these samples were taken by Inspector Brownell, was from one of the producers shipping milk to this company and not from several producers. In view of the evidence of these two witnesses, and as a matter of justice to all concerned, I am of the opinion that for the present at least, the order of the Health Officer should be modified so as to apply only to the milk of the producer from which the samples in question were taken. It is therefore,

'ORDERED, That the order of the Health Officer, dated June 20, 1910, and directed to the Big Elm Dairy Company, be, and hereby is modified, so as to call for the exclusion from the city of the milk and cream produced by J. F. White & Company, until such time as the J. F. White & Company herd of cattle is subjected to the State tuberculin test.

“(Signed.) CHARLES S. OWEN,
'Commissioner of Public Safety.'”

“To G. W. Goler, M. D., Health Officer.”

(Reading of letter from G. W. Goler, Health Officer, dated July 11, 1910, to Charles S. Owen, Commissioner of Public Works.)

“Hon. Charles S. Owen, Commissioner of Public Works,
Rochester, N. Y.

“Sir:—

“Beginning a year ago last January the Health Bureau has been working to prove by the guinea pig test, the general provisions with which you are familiar, the number of retailers selling milk in Rochester from cattle whose milk is capable of producing marked naked eye lesions of tuberculosis in those animals.

“Rochester receives daily 80,000 quarts of milk from 8,000 cows from 700 farms. This of course does not include the cream received. With our limited force of milk inspectors, we have not been able to determine just how much cream is received, for it comes from very many small farms and is received at creameries in the neighborhood of Newark, Horseheads, Norwich, Conesus, and some other places. The milk and cream received into the city are disposed of by 133 dealers, all of whom are, and have been for some time, selling milk without licenses.

“In beginning our work in an attempt to further protect child life in Rochester, and considering the limited facilities, we took samples of milk in original packages, or in sterile pine bottles from the retailers, because we believed that the retailer, whether getting milk from one or many producers, should be held responsible for the milk he sold, and that if he be found with milk in his possession capable of producing marked naked eye lesions of tuberculosis, the burden of proof should

then be upon him to show that his entire supply was free from tuberculosis by the State tuberculin test of his herds, applied by the Veterinary Division of the State Department of Agriculture.

"For something more than a year past we have worked upon this plan. Mr. Marshall, our Milk Inspector, has been most diligent; our chemist, Mr. Milligan, has pursued this work with enthusiasm; and now at the end of the period which will expire at the close of the current month, we shall have finished the test of the retailers upon this plan. We planned this work to end with the beginning of summer, because the work of the summer milk stations then begins. Vacations also begin, and the summer activities of the Bureau are sufficient to occupy all of its energies.

"The plan which you request us to carry out in your letter would involve the test of 500 producers. Estimating for deaths that might occur as a result of acute infections, at least 1,200 guinea pigs would be required in lots of 106 each. New pens and new stock pens would be required. Our centrifugal machine would have to be repaired and a new centrifugal machine provided. New glasses for the centrifugal machine would have to be made, and these in the winter we have never been able to get in less than a month or six weeks.

"The glass factories are shut down now, and an order could not be placed for them before the 15th of September. We have on hand just one set of glasses. If we should adopt the plan contained in your letter and should work twice as fast, assuming that supplies and apparatus were in readiness, it would take us more than a year to finish the work.

"The test known as the guinea pig test, with which we are working, is always positive when it is positive; but when it is negative, it does not prove that the cattle tested are free from tuberculosis. In our work thus far, not counting the samples of retailers that we already have under way, and that will be finished by the end of the month, we have tested in round number 1,700, more than 20% of the 8,000 cattle supplying Rochester with milk. More than 200 of these cattle have been killed, i. e., more than 12% of the cattle found infected through our work.

,"Mr. Marshall, the Milk Inspector, has persuaded 41 of the 58 owners of the herds tested by the guinea pig test, to have their herds tested by the State Veterinarian, by representing to them the economic value of this test. He has gone to these men and carefully presented the case to them, filled out a form such as the enclosed, and forwarded the form to Albany.

"All that I have said in this letter of course deals with milk only, and not with cream. The people in Rochester are buying tuberculous cream from cattle kept in the filthiest conditions, from creameries filthy in the extreme, and the large companies who sell cream to the people in this vicinity are getting cream from such places. So far as I have been able to determine, I have not been able to stop this practice.

"If, after my explanation contained in this letter, you still believe that the work should be carried on as requested in your letter of July 8th, will you not direct by order that the work be so carried on.

"Respectfully submitted,

(Signed.) G. W. GOLER,
"Health Officer."

That is the way they stopped us.

Q. Well, Dr. Goler, I understand that as a result of this hearing before Commissioner Owen, it was determined by him that the milk you

tested and found re-acted on the guinea pigs, was from the dairy of the J. R. White Company.

A. That was one of the dairy companies. The J. R. White Company were dealers in high grade cattle, and their cattle were sold. They were very careful about their cattle. All their calves which were very precious to them and very valuable, were being treated by killed cultures. All tuberculins by themselves. No tuberculins near immunes in order to protect them against tuberculins. But they are willing to take tuberculins and sell the milk to Rochester, and that was the only recourse we had then. Another lot of cattle came along that were tubercular, and we could not do anything after that.

Q. You found that milk that was complained of here in the Big Elm Dairy Company came from the J. R. White Company?

A. Yes.

Q. And you requested them to make the test?

A. We had already.

Q. They were excluded until the test was made?

A. Such a test had already been made. There was a controversy on that side.

Q. What was the controversy?

A. Owen was my superior. I never had any trouble with my superior—until now I am ready to resign.

Q. I do not understand yet how you were prevented from making this test.

A. The Big Elm Company stopped us in this way. They had five hundred producers, just as the City Dairy Company, the rottenest company that sold milk to Rochester. They were filthy beyond measure—the Brighton Place Dairy Company taking milk from vast numbers of tuberculous cattle. We wanted to go in and test the herds, instead of making tests from finished producers of one of these big companies who massed the milk, and produce the burden of proof on the large companies.

Q. You had no authority to do that?

A. No, sir.

Q. You had authority to test the herds?

A. We did of all the small dealers, testing them first, realizing that just as soon as we got up against the big companies we would run against a stone wall, as we did.

Q. What was there to prevent your testing the herds of the Big Elm Company?

A. Simply because we were at the end of our rope. At this time we had two and a half milk inspectors to do this work. We could not in the nature of things. We had to plan our work so that when we had

a let down at one time, we could do a little more work of one kind than another, and to test, as I said in my letter, it would then have taken us a year to do that sort of work, and we could not begin until after the summer season was over, because the glass factories were shut down, and we had worn out our centrifugal machines in getting out these samples of milk.

Q. That is the last that has been done in regard to the tubercular test?

A. Yes, sir.

Q. There is not any reason why you should not have gone out the next year, when you got your machinery?

A. No, sir, there was not.

Q. And so since 1910 there has not been any test made to indicate whether or not tubercular milk was being furnished to the people of the City of Rochester?

A. No, sir.

Q. Do you believe it is being furnished?

A. I am sure of it.

Q. What is the reason that your Department does not go on with it?

A. I have not the help.

Q. How much help should you have to do it then, what help to go on with this work?

A. We should have at the present time two or three additional milk inspectors. We are not able to do it with the milk inspectors now as it should be done; an additional chemist, because the work is altogether too much for one chemist; and one bacteriologist. We have had work pile up in a very considerable way, and work that was quite as important as this, and this is only a sample of the kind of piece work we attempted to do to see whether the people of Rochester were interested. But they were not interested; and the Milk Commission was not interested. The Milk Commission was not interested in getting ordinary milk tested to see whether the ordinary babies would have milk from tuberculin tested cows. They were only interested in testing certified milk.

Q. With two or three inspectors and an additional chemist you could go ahead testing all the cows from which milk comes?

A. Very well, yes, sir, and put the burden of proof on the big companies to show that the herds from which they get milk are free from tuberculins. From five to seven per cent. of all tuberculosis was—I don't know what the figures are now—due to bovine tuberculosis.

Q. Is the guinea pig test still in vogue?

A. I don't know.

Q. Did you lose all interest in the matter?

A. I did lose all interest. I have lost absolutely all interest in the

whole milk question, save for doing this kind of work, because the people of Rochester have not been interested in the kind of milk which they fed to their children and fed to themselves—any more than the interest in the kind of water they get.

Q. You don't want to testify that your interest in providing a wholesome milk supply for the City of Rochester depends upon whether or not they know the danger they run?

A. No.

Q. What I would like to know, and what the Council would like to know, is why you have not proceeded to obtain this extra help that is needed to go ahead and test these cattle?

A. I have asked for the help, but I have n't had it.

Q. Can you tell us when you asked for this extra help? Is it a matter of record?

A. It is.

Q. When was it?

A. Several times.

Q. You will look it up and furnish it to us?

A. Be glad to.

Q. Now, milk is dipped in the City of Rochester to some extent?

A. Yes.

Q. That means taking the can that the producer delivered it in around and dipping out of it into the consumer's pail?

A. Yes. In response to that question of course it means grocer's dipped milk.

Q. That is, grocers have it in cans and dip it out?

A. In the outskirts, yes.

Q. Sometimes the original package in which it was poured from the milk pail?

A. I don't know about that.

Q. What is the objection to that?

A. The objection to that is that milk may be put into dirty containers; that is, the milk may be contaminated by the surroundings in which the milk is kept. There are some dangers of that kind to which milk in grocery stores may be exposed.

Q. There is no ordinance or statute prohibiting that in the City of Rochester?

A. No, sir.

Q. Do you think there should be?

A. I do. When considering that point, I have advocated for some time that wherever milk was sold, it should be in the original package. That is, if Jones wanted to buy milk from a large milk dealer, he should

buy and sell in original packages. The answer to that was that these people could buy dipped milk that was good for food for adults and not dangerous—you can buy cheaper than when sold in original packages.

Q. Now, Doctor, there have been occasions when your attention has been forcibly called to the contraction of typhoid fever from milk in the city?

A. Yes, sir.

Q. What were some of those occasions, tell us about them?

A. Let us read it from the record. As far as I know there has been no typhoid in Rochester traceable to milk in a number of years.

Q. How many?

A. Well, one's memory—I hesitate about that question in giving you a number; more than five I would say. How many more than five I can't tell you.

Q. On the subject of sanitation and the delivery to the people of wholesale milk, what do you say ought to be done in the City of Rochester that is not—to secure people a supply of wholesome milk at the lowest possible cost?

A. In the first place, we will have to have some department inspection and laboratory service. That is the first thing.

Q. Tell us what they would do.

A. Simply supplement the work of the inspectorial staff that is being done. We are not able under present conditions to make the number or kind of inspections with sufficient frequency that a reasonably safe milk supply requires.

Q. How often do you think the dealers' supply ought to be inspected?

A. That depends upon the dealers. Some of the dealers would need very little inspection, some of them ought to be inspected every month; some ought not to be in business at all.

Q. Why are they in business?

A. Because there is no legal way of putting them out of business, and no sufficient force of inspectors to determine which ought not to be in the business.

Q. What we need then is a sufficient force so as to find which of these dealers ought not to be in the business; then we need some new machinery whereby we can put them out of business?

A. It is rather an extension of the present machinery. As far as I am concerned, I have no fault to find with the present machinery. The present machinery is doing all that it possibly can do. It cannot stand very much more stress.

Q. Added inspection and laboratory equipment and help?

A. Yes, sir.

Q. And what else?

A. I think that covers it.

Q. What have you to suggest, Doctor, in regard to the price of milk? How can we get cheaper milk?

A. We can get cheaper milk by simplifying delivery.

Q. In what respect?

A. Simply by zones. I don't mean absolutely by zoning, but by dividing the town up into districts, so a man does not have to cross and re-cross—one man does not have to re-cross another man's district. The letter carrier, Mr. Van Duser of the letter carriers' organization, struck the note last night. And a good many years ago there appeared in one of the Fabian publications in England, the statement of a man who was looking out of the window and said he saw 14 grocery wagons, seven or eight butcher wagons, and Lord knows how many other wagons—and one postman.

Q. Do you advocate some system of compelling the dealers?

A. I do not know. I would not compel them.

Q. How would you get at it?

A. I don't know. I think we need information; I want to know.

Q. Doctor, going back to the question of the tubercular test, assuming that this appeal has been made, and this order was made by Commissioner Owen at the time, what was there other than shortage of help in your department, to prevent these tests from going on?

A. I have gone over that already, Mr. Bechtold, and told Mr. Pierce, and told the Committee in answer to Mr. Pierce's questions, that there was not anything to interfere except shortage of help. It was impossible to get help, and because of the work and our material being worn out, and it would take us a year to go on with the work.

Q. Why did you make the statement or say that the large companies prevented you from continuing this?

A. They did.

Q. Your reply is inconsistent, Doctor. It seems to me this shortage of help—the companies did not have anything to do with that?

A. They did not have anything to do with that, but when they objected to that order, and made me go to New York by way of San Francisco and China, that is the way they interfere with our doing the work.

Q. Have you reference to this one appeal?

A. This one appeal, because we did nothing after the appeal.

Q. Don't you think that that was fair? To cut off a contaminated source of supply for any company—don't you think that is fair?

A. Yes—to cut off one and let the other very large number remain.

Q. Do you have any figures as to the portion of re-actors in the territory furnishing milk to Rochester?

A. The figures I gave you a little while ago.

Q. How much?

A. Somewhere between fifteen and twenty per cent.

Q. One herd went fifty per cent.?

A. One herd was fifty per cent. tuberculous.

Q. An average of twenty per cent.?

A. I don't know what the average would be now. Perhaps less, because farmers are taking better care of their cattle; they are doing more things; they are trying to eliminate the cow that is no longer good for much, that is not paying her board. And I think by that same token there are fewer tuberculous cattle in herds.

Q. You would be in favor of the city taking over the milk business?

A. I am—taking over the distributing end.

Q. Not the producing end?

A. No.

Q. Your opinion would be based upon what was disclosed as a result of a study of this kind, assuming that the study goes into the question of the distribution of milk?

A. Yes.

Q. You mean by that, that if the study of this situation disclosed that it was advisable to the city to go into the business, you would be in favor of it?

A. Yes.

Q. And if it did not, you would not?

A. No.

Q. What do you think about the milk supply of the City of Rochester? What is your belief?

A. My belief, based on some considerable observation both in the past and at the present time, and upon reports from the nurses working in our welfare stations, and who have been familiar with the work in the welfare stations and in the densely populated districts, is that our children are not getting milk as they once were getting milk; not as they ought to get it. Now, what else they are lacking which they might get, nobody knows. As I said this morning, we are going to have examples of pot-bellied children, with skeleton legs and arms. Unless we can get better nutrition for our little children, we are certainly going to have a race deterioration of some kind in some degree in the very near future; and reasoning from biological grounds, the young, when it has been once deprived of its nutrition in early life, does not readily regain that which it has once lost.

TESTIMONY OF MR. F. E. GANNETT

MR. F. E. GANNETT, who appeared as a witness at a public hearing, held at the City Hall, Rochester, N. Y., on July 23, 1919, gave the following statement:

Q. You have been in the newspaper business for some time, I believe?

A. Yes, about twenty years.

Q. During the past year, you paid special attention to the subject of milk in the City of Rochester and its production outside, etc.?

A. Yes.

Q. Will you tell us in your own way what you have done about that and what you have ascertained and what your conclusions are that you found out?

A. Well, my attention was first called to the milk situation in Rochester a year ago when I looked over the report of the Health Bureau of the city. That report was so astounding to me that I began to look into the question. The report for July, 1918, for instance, showed that there were ten dealers selling milk here with a bacteria count of over five million; there were eighteen selling milk with over three million counts. There were forty-one with over a million counts. Of this whole number only nineteen were pasteurized.

I had had the impression from living out of the city that Rochester milk supply was about the best in the country and I was quite amazed to find that they were not only not protected against impure milk, but that most of the milk had a very high bacteria count from those figures apparently.

SANITARY CONDITION OF ROCHESTER MILK SUPPLY

DAIRY FARM SANITATION

The dairy farm inspectors who were employed by the Survey to visit dairy farms, did so with two purposes in view. In the first place they made studies of the cost of milk production; and in addition to this they made inspections of the dairy on each farm to determine the sanitary conditions. For the purpose of the sanitary inspection they used a printed report blank which was especially prepared for this work, and noted thereon a statement of the condition of the buildings and equipment and the manner in which all of the dairy operations were performed. One hundred and forty-one dairy farms located in each of the important districts from which Rochester milk is furnished, were inspected in this way, and report blanks from each farm returned to the office of the Survey. From these blanks a summary was prepared, which shows the results of these sanitary inspections, as indicated in Table No. 87.

TABLE NO. 87

PUBLIC SAFETY COMMITTEE OF THE COMMON COUNCIL OF
ROCHESTER, N. Y.

MILK SURVEY

CHARLES E. NORTH, M. D., DIRECTOR OF SURVEY.

REPORT OF DAIRY FARM SANITATION

Total number of farms inspected..... 141

	Yes.	No.	Good.	Bad.
Cows:				
Physical examination of cows by veterinarian	134	4	..	..
Tuberculin tested by veterinarian	20	105	..	..
EMPLOYEES:				
Diseased	..	141	..	..
COW FEED:				
Distillery waste used	31	110	..	..
Any unwholesome food	1	140	..	..
COW STABLE:				
Construction	..	..	138	3
Sanitation	..	..	137	4
COW YARD:				
Condition	..	..	127	10
WATER SUPPLY:				
Safe	138	2	..	..
PRIVIES:				
Safe	132	4	..	..
MILK HOUSE:				
Construction	..	..	140	..
Sanitation	..	..	140	..
MILKING:				
Udders clean	114	..	..	..
Hands clean	121	..	..	..
MILK PAILS:				
Small tops	131	6	..	..
Pail racks	135	2	..	..
Sanitation	..	..	139	..
MILK CANS AND LIDS:				
Inverted on can racks	129	10	..	..
Sanitation	..	..	134	5
WASHING PAILS AND CANS:				
Performed at once	128	12	..	..
Brushes used	102	36	..	..
Alkali powder used	116	20	..	..
Is washing done mornings only	5	134	..	..
STRAINERS:				
Are strainers used	99	31	..	..
Are tin holders used	127	7	..	..
Condition	..	..	129	..
Strainer cloth (using one only)	6	..	..	..
Strainer cloth (using two or more)	130	..	..	..
Condition	..	..	129	..
Strainer cloths washed A. M.	136	..	..	..
Strainer cloths washed P. M.	131	..	..	..
STIRRING RODS:				
Stirring rod of wood	7	..	..	..
Stirring rod of metal	49	..	..	..
Sanitary	56	..	..	..

STERILIZING:

Steam supply	4	..	..	..
Hot water supply	87	..	..	..
Hot water from kitchen stove	132	..	..	..
Stove and boiler at milk house	2	..	..	..
Strainer cloths boiled A. M.	122	..	..	..
Strainer cloths boiled P. M.	113	..	..	..

COOLING:

Ice supply	52	79	..	..
Sufficient for entire season	47	8	..	..
Open cooler	64	20	..	..
Cooling tank	127	1	..	..
Cans submerged up to neck	125	..	..	..
Is dairy equipped with scrubbing brushes	97	27	..	..
Alkali washing powder	106	18	..	..

TEMPERATURE OF TANK WATER.		TEMPERATURE OF MILK A. M.		TEMPERATURE OF MILK P. M.	
	No.		No.		No.
40—44°F.....	22	40—44°F.....	4	40—44°F.....	5
45—49°F.....	19	45—49°F.....	3	45—49°F.....	26
50—54°F.....	37	50—54°F.....	50	50—54°F.....	49
55—59°F.....	14	55—59°F.....	31	55—59°F.....	20
60—64°F.....	22	60—64°F.....	20	60—64°F.....	26
65—70°F.....	8	65—70°F.....	7	65—70°F.....	2

HOURS OF MILKING				MILK DELIVERED FOR SHIPMENT			
A. M.	No.	P. M.	No.	A. M.	No.	P. M.	No.
4:30.....	3	2:00.....	3	6:30.....	3	6:00.....	1
5:00.....	57	4:00.....	15	7:00.....	28	6:30.....	1
5:30.....	44	4:30.....	9	7:30.....	32	7:00.....	3
6:00.....	30	5:00.....	42	8:00.....	30	7:30.....	..
6:30.....	..	5:30.....	29	8:30.....	7	8:00.....	1
7:00.....	3	6:00.....	27	9:00.....	9	8:30.....	..
		6:30.....	7	9:30.....	3	9:00.....	..
		7:00.....	2	10:00.....	5		
				11:00.....	1		

From Table No. 87 it is evident that the dairy cows were in apparently healthy condition, being periodically examined physically by a veterinarian in accordance with the State law. On only 20 farms out of the 141 were the cows tested for tuberculosis. This test was voluntary, as there is no State or City regulation requiring same.

All farms reported employees free from disease. It is noteworthy that on 31 farms distillery waste was used for feeding cows. It is necessary to use this with extreme care and most cities now prohibit the use of such cow feed.

Regarding the sanitary condition of the buildings and equipment, there was very little fault that could be found. The external appearance of these farms was uniformly good. This is due chiefly to the activity of the Health Bureau of the City of Rochester which has made a special

effort in the inspection of dairy farms and as a result of these inspections brought the majority of farms to a condition where they would give a good sanitary score.

Under the heading of "Sterilizing," it is noteworthy that only four farms are supplied with steam boilers and that only two farms have a stove and hot water boiler in the milk house. One hundred and thirty-two farms report their source of hot water supply as the "Kitchen Stove." Unless the kitchen stove in a farm house has special arrangements for furnishing hot water in excess of ordinary household needs, (such as a wash boiler or large kettle) it commonly happens that there is not sufficient hot water at all times to properly sterilize milk cans and milking pails. The sterilization of milk cans and milk pails is the most vital of the sanitary operations in the entire list and unsanitary milk is commonly due to neglect of such sterilization.

COOLING

Under the head of "Cooling" it is noteworthy that only 52 out of 141 farms were supplied with ice. The number is undoubtedly much smaller this year than in other years, due to the unusual shortage of ice last winter. In a climate such as the Rochester climate, where a large crop of ice can easily be obtained each year, there is no reason why every dairy farmer should not have an ice supply sufficient to cool his milk with ice during hot weather.

The cooling of the milk as performed on these dairy farms is carried out chiefly by the use of well water pumped into tanks in which the milk cans were placed. The report shows that on 81 of the farms the temperature of the tank water was from 50 to 70 degrees. These temperatures are too high to permit sufficient cooling of the milk or prevent the growth of bacteria. The temperature of the morning's milk was taken on 108 of these farms and ranged as shown in the tabulation, from 50 to 70 degrees, and the temperature of night's milk on 87 farms had the same range. On the greater number of these dairies, both morning's and night's milk ranged between 50 and 60 degrees.

This is as cool as it was possible to make the milk with such water as was available for cooling purposes.

The hours of milking both morning and night were determined on most of the dairy farms, and hours at which milk was delivered to railway stations and trucks for shipment. The inquiries show that on 93 farms out of the 141, the milk was delivered in the morning for shipment by 8:00 A. M.

In general, the sanitary condition of the dairy farms compares favorably with the sanitary condition of dairy farms supplying milk to other cities.

SANITARY CONDITIONS OF DEALERS' MILK PLANTS IN CITY OF ROCHESTER

Four city milk inspectors were employed in the work of making sanitary inspections of the milk factories in the City of Rochester. They used a standard form of report blank, on which were noted the conditions of plants and their equipment, the methods used in the performance of all operations, milk handling, the temperatures of pasteurization and of cooling milk, and the efficiency of the processes of washing and sterilizing. In addition to this, other minor features of the conduct of the business were noted. One hundred and thirty-two milk delivery stations in the city were inspected in this manner, out of a total number of 136. Detailed reports of these inspections were delivered to the office of the Survey and by the statisticians summarized in the form of a tabulation as indicated in Table No. 88.

TABLE NO. 88
REPORT ON MILK PLANTS—SANITARY OPERATIONS
EQUIPMENT

	Yes.	No.
1. BUILDING—Located among sanitary surroundings.....	116	16
2. FLOORS—Constructed of water-tight material.....	128	2
2a. Floor properly graded and drained.....	120	4
3. WALLS AND CEILINGS—Constructed of hard material.....	111	17
3a. Smooth	105	16
3b. In good repair.....	111	14
4. DRAINAGE—Sufficient floor drains.....	128	2
4a. Disposal satisfactory	123	5
4b. Plumbing in good repair.....	122	5
5. LIGHT—Sufficient (at least 8% floor area).....	116	11
6. VENTILATION—Sufficient.	121	6
7. MILK HANDLING ROOMS—Separate from stables, etc.....	125	4
8. REFRIGERATOR—Properly constructed	106	7
9. WATER SUPPLY—Adequate	125	4
9a. Tap or hose bibb connection.....	115	20
9b. Running hot water convenient	107	21
10. LOCKERS—Provided for employees.....	105	23
10a. Conveniently located	105	9
10b. Suitable and adequate	104	12
11. WATER CLOSETS—Provided	115	12
12. WATER CLOSETS—Properly enclosed and ventilated.....	120	2
12a. In good repair	120	..
12b. Doors self-closing	5	3
13. WASTE RECEPTACLES—Suitable if required.....	44	8
14. SCREENS—In windows and other openings.....	44	69
15. DRESSING ROOM—Conveniently located.....	115	13
15a. Hot running water	113	8
15b. Soap	114	9
15c. Common towel prohibited.....	26	14
16. MILK HANDLERS—Clothing of white wash material.....	34	94
16a. Apparently in good health.....	123	4
17. STABLE FOR HORSES—Sanitary	105	8
18. MILK WAGONS—Suitable if required.....	119	3
19. BOTTLE FILLER—Suitable	80	3

19a. Machinery	97	..
Or, by hand	30	..
20. BOTTLE CAPPER—Suitable	39	3
20a. Machinery	9	..
Or, by hand	112	..
21. PUMPS AND PIPES—Sanitary construction.....	83	6
22. PASTEURIZER—Sanitary construction	23	4
23. COOLING DEVICE—Sanitary construction.....	80	3
24. VATS—Sanitary construction	112	4

OPERATION

	Yes.	No.
1. MILK RECEIVING—Separate	2	32
a. Receiving tank sanitary and clean.....	95	18
b. Milk filter clean and sanitary.....	114	9
c. Milk protected	112	5
d. Inspected for taint, temperature, sourness.....	109	7
2. BOTTLE WASHING—Bottles brushed.....	120	1
a. Hot alkaline wash water.....	126	1
b. Rinsed with clean water.....	124	3
c. Sterilized	74	53
d. Apparatus used	82	32
e. Bottles inverted or protected.....	119	7
f. Stored in sanitary place	115	7
g. Bottle racks washed	94	29
3. CAN WASHING—Cans brushed	128	..
a. Hot alkaline wash water.....	131	..
b. Rinsed with clean water	129	2
c. Apparatus used	27	90
d. Sterilized	101	25
e. Lids cleaned and sterilized same as cans.....	99	40
f. Proper can racks provided.....	123	7
g. Cans free from rust and seams.....	129	2
h. Shipment cans cleaned before return.....	131	1
4. APPARATUS WASHING—Including		
a. Pipes, pumps, pasteurizer, cooler.....	25	3
b. Taken apart daily	114	6
c. Apparatus used	53	17
d. Brushed with hot alkaline water.....	124	..
e. Rinsed with clean water.....	124	..
f. Sterilized	79	44
g. Steam hose connection	74	44

4h. BOILER PRESSURE

Lbs.	No.	Lbs.	No.	Lbs.	No.
10	1	70	5	140	..
15	3	75	1	150	..
20	1	80	9	160	..
30	1	90	..	165	1
40	11	100	10	170	..
50	7	110	..	180	..
55	1	120	2	190	..
60	26	130	..	200	1
		45	1		

4i. Apparatus protected after sterilizing.....	112	6
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5. PASTEURIZING

1. Milk heated to:

Temp'ture.	No.
140.....	4
142.....	10
144.....	4
145.....	4

2. Milk held at:

Temp'ture.	No.
140.....	5
142.....	11
144.....	4
145.....	2

3. Milk cooled to:

Temp'ture.	No.
34.....	1
35.....	1
36.....	1
38.....	1
40.....	4
42.....	2
45.....	3
47.....	1
48.....	1
50.....	6

All but one held 30 minutes.

One held at 20 minutes only.

	Yes.	No.	Lbs.
a. Temperature control	17	5	
b. Temperature recorder	22	..	
c. Steam—Hot water heater	19	..	
d. Mixing in holder	18	2	
f. Exposed during process	5	17	
g. Steam supply adequate	22	..	
h. Ice supply or refrigeration adequate.....	21	1	
i. Pasteurizer—Capacity	..	..	28,381

6. COOLING

a. Raw milk cooled to:

Temp'ture.	No.
34.....	2
35.....	3
36.....	1
38.....	10
40.....	46
42.....	6
43.....	2
45.....	18
46.....	3
48.....	3
50.....	5

b. Raw milk held at:

Temp'ture.	No.
32.....	1
34.....	1
35.....	5
38.....	14
40.....	77
41.....	1
42.....	10
43.....	1
45.....	13
46.....	2
48.....	1
50.....	5

	Yes.	No.
c. Cooler protected	115	8
d. In sanitary place	112	9
e. Storage cooling vats—concrete	103	3
f. Ice water clean	95	18

7. BOTTLING AND CAPPING:

	Yes.	No.
b. Bottling by automatic device	113	10
c. Hands not allowed to touch bottles	53	72
d. Bottle tank covered	114	6
e. Caps clean and protected	113	4

8. CAN FILLING—Filled in clean manner.....

20 1

a. Lids protected	11	6
b. Paper, if used, clean	6	1

9. WAGONS—Retail, clean

114 5

a. Wholesale—clean	61	..
b. Railroad platform—clean.....	52	1

10. STABLE—clean

101 9

MAINTENANCE OF PLANT

	Yes.	No.
1. FLOORS—Clean	110	11
2. Washed daily	95	26
3. WALLS AND CEILINGS—Clean	90	31
4. Properly painted	75	25
5. WINDOWS—Clean	71	47
6. RUBBISH—Not allowed to accumulate	43	76
7. Spitting and smoking prohibited	101	18
8. WASTE CANS—Clean	66	9
9. WATER CLOSETS—Clean	71	5
10. MILK HANDLERS' CLOTHING—Clean	97	23
11. STREET CLOTHING—Not in milk rooms	35	85

GENERAL

	Yes.	No.
a. Milk tested as to temperature on arrival	17	41

b. AVERAGE TEMPERATURE.

Degree	No.	Degree	No.	Degree	No.
45.....	3	58.....	2	68.....	5
50.....	5	62.....	1	69.....	1
53.....	1	64.....	7	70.....	4
55.....	1	65.....	1	72.....	1
56.....	1	66.....	2	75.....	2
		67.....	2		

	Yes.	No.
c. Milk tested for fats and solids	11	23

d. PER CENT. BUTTER FAT.

Number	Per cent.
2	3.6
1	3.4

PER CENT. T. S.

1 12

	Yes.	No.
e. Milk examined for bacteria count (by Health Bureau)	70	41

COLONIES PER CC.

No.	Count	No.	Count	No.	Count
2....	10,000	2....	30,000	1....	80,000
1....	12,000	1....	40,000	2....	114,000
1....	17,000	1....	44,000	1....	250,000
1....	20,000	1....	53,500	1....	400,000
		2....	70,000		

	Yes.	No.
g. Are caps and tags marked to show place and date of pasteurization, bottling or production?	22	52
h. Has there been any infectious disease in household of milk handlers?	..	47
i. Do you refuse milk suspected to be adulterated, dirty or infected?	69	1

EMPTY CONTAINERS RETURNED FROM ROUTES

a. PER CENT. OF BOTTLES RETURNED DIRTY.

Per cent.	No.	Per cent.	No.	Per cent.	No.
1 $\frac{1}{8}$	1	4.....	2	20.....	5
$\frac{1}{2}$	1	5.....	7	25.....	5
1 $\frac{1}{3}$	2	8.....	2	40.....	2
1.....	9	10.....	20	50.....	5
2.....	15	12.....	2	60.....	1
3.....	2	13.....	1	80.....	2
		15.....	3		

b. PER CENT. OF CANS RETURNED DIRTY.

Per Cent.	No.
100	9
30	1
0	5

c. WHAT STEPS ARE TAKEN TO INSURE CLEANSING BEFORE RETURN BY CUSTOMER?

Instructed to rinse bottles.....	5
Homes visited—Drivers held responsible.....	1
Nothing	38

d. WHAT DO YOU DO IN REGARD TO EMPTY RECEPTACLES FROM INFECTED HOMES?

Never had any	1
Nothing	1
Refuse	8
Do not remove them	18

From the summary of these reports it will be seen that in most instances the building and equipment of the city milk plants are in good condition. Among the exceptions worthy of notice are the following:

- (1.) In only 26 factories is a common towel prohibited. The use of paper towels is to be recommended where the cost of cloth hand towels is too expensive.
- (2.) In only 34 of the 132 factories visited were the employees dressed in white, washable overalls.
- (3.) Only 44 of the factories were provided with screens in the windows against flies.
- (4.) In only two factories was milk received in a separate room from the other operations.
- (5.) In 53 of the plants visited the glass bottles are not sterilized.
- (6.) In 25 of the plants the milk cans are not sterilized, and in 40 of them the lids of the cans are not sterilized.
- (7.) In 44 of the factories the apparatus used is not sterilized.

THE PASTEURIZATION OF MILK

Four factories were heating the milk not above 140 degrees. This is lower than the temperature decided upon by the highest authorities as necessary for the destruction of bacteria under commercial conditions.

In five factories the milk pasteurized by the Holding method was not heated above 140 degrees, which is a temperature too low for effective results.

All of the factories are using the Holding method of pasteurization. All but one held the milk for 30 minutes at the highest temperature,

which time is recognized as necessary for effective results. One factory held the milk at the highest temperature for only 20 minutes, which is too short a time.

In the cooling of milk the report shows that in the pasteurizing plants, 9 were cooling to 40 degrees and below, while 13 were cooling to temperatures between 40 and 50 degrees. It is recognized for efficient pasteurization and the protection of the milk after pasteurization, that it should be cooled as the last step in the process, to temperatures below 40 degrees. Five of the pasteurizing plants were not provided with temperature controllers. All of them were provided with temperature recorders.

In milk plants handling raw milk, temperatures to which milk was cooled were also taken. The report shows that in 62 of these the milk was cooled to 40 degrees or below, which is satisfactory, while in 37 the milk was cooled to temperatures of from 40 to 50 degrees. In 98 factories raw milk was handled in cold storage rooms at temperatures below 40 degrees, while in 33 factories the raw milk received was held in cold storage in temperatures of between 40 and 50 degrees.

One hundred and thirteen factories used machinery for filling bottles.

In 53 factories the machinery is arranged so that the hands do not touch the bottles during bottlings.

Temperatures taken of milk during August and September on its arrival in the city by inspectors, were taken from cans on the railroad platforms. Thirty-nine samples in all were tested. Of these,

	7	were	70	degrees	and	above.
11	"	65	to	69	degrees.	
12	"	55	to	64	"	
6	"	50	to	55	"	
3	"	45	to	50	"	

In the majority of these samples the temperatures were too high and would stimulate the growth of bacteria.

Some of the bacterial tests were made by the Health Department during the month that inspections were recorded.

With the exception of a few of the smaller plants where unsanitary conditions were found, the sanitary inspectors' reports indicate a fairly good condition of the city milk factories. Lack of sterilization and lack of proper cooling, which are always the two main faults in milk sanitation, are the most prominent faults to be found with the sanitation of these plants.

BACTERIAL TESTS OF ROCHESTER MILK SUPPLY

The sanitary character of the milk itself must always be considered independently of the sanitary condition of the farms and factories. To

determine the sanitary character of the milk, arrangements were made for carrying out some special bacterial tests. The University of Rochester, through its Department of Vital Economics, kindly offered the facilities of one of its bacteriological laboratories to the bacteriologists employed by the Survey. These laboratories were offered without expense to the Survey and every convenience that could be desired was provided. The Survey employed two bacteriologists at different times to collect samples of milk and make bacterial tests.

The total number of samples tested was 350. A number of milk factories were visited and samples taken of the process of pasteurization in order to determine the efficiency of this process. In such factories samples were taken from the mixing tank in which the milk from the cans was poured and mixed before pasteurization. If passed through a clarifier before pasteurizing, samples were taken from the clarifier and from each pasteurizer. They were then taken from the heater after the milk was heated and from the holder after the milk was held at the required temperature for the required period of time. Another set of samples were then taken from the cooler after cooling and from the bottle filler after the milk had passed through the filler, but before it entered the bottle. The last set of samples were taken from the filled bottles themselves. Another series of samples were taken from the railroad platforms from the farmers' cans as they were received.

The results of all this work are tabulated and summarized in Table No. 89.

TABLE No. 89

SUMMARY OF TABULATION OF BACTERIOLOGICAL TESTS.

2. (CANS.) RAW MILK AS RECEIVED:

Bacteria per cc.	No. of Samples
Below 50,000	18
50,000 to 100,000	37
100,000 to 200,000	60
200,000 to 500,000	47
500,000 to 1,000,000	22
1,000,000 to 5,000,000	18

3. SAMPLES FROM MIXING TANK:

Bacteria per cc.	No. of Samples
100,000 to 200,000	3
200,000 to 500,000	8
500,000 to 1,000,000	6
1,000,000 to 5,000,000	17

4. SAMPLES FROM CLARIFIERS:

Bacteria per cc.	No. of Samples
185,000	1
190,000	1

5. SAMPLES FROM HEATER:

Bacteria per cc.	No. of Samples
1,000 to 10,000	1
10,000 to 25,000	3
25,000 to 50,000	4
50,000 to 100,000	4
100,000 to 200,000	..
200,000 to 500,000	2

6. SAMPLES FROM HOLDER:

Bacteria per cc.	No. of Samples
1,000 to 10,000	4
10,000 to 25,000	..
25,000 to 50,000	8
50,000 to 100,000	2
100,000 to 200,000	2

7. SAMPLES FROM COOLER:

Bacteria per cc.	No. of Samples
1,000 to 10,000	3
10,000 to 25,000	9
25,000 to 50,000	4
50,000 to 100,000	4
100,000 to 200,000	2

8. SAMPLES FROM BOTTLE FILLER:

Bacteria per cc.	No. of Samples
1,000 to 10,000	1
10,000 to 25,000	3
25,000 to 50,000	4
50,000 to 100,000	..
100,000 to 200,000	2
500,000 to 1,000,000	..
1,000,000 to 5,000,000	1

9. FROM FILLED BOTTLES:

Bacteria per cc.	No. of Samples
1,000 to 10,000	4
10,000 to 25,000	5
25,000 to 50,000	11
50,000 to 100,000	11
100,000 to 200,000	6
200,000 to 500,000	3
500,000 to 1,000,000	4
1,000,000 to 5,000,000	2

From Table No. 89 it appears that out of 202 samples taken directly from farmers' cans, 18 contained milk testing from one million to five million bacteria; 22 from five hundred thousand to a million, and 47 from two to five hundred thousand. When one considers the nearby source of supply for the City of Rochester, it is not unreasonable to expect milk to arrive in the city containing not more than two hundred thousand bacteria, if sanitary precautions have been carried out. Consequently, at least 87 of the samples of milk out of the 202 contained numbers of bacteria so large that they plainly indicated lack of proper sanitary precautions.

This is further indicated by the samples taken from the mixing tanks of the pasteurizing plants. Thirty-four of these were taken and 31 contained bacteria in excess of two hundred thousand, while 17 contained bacteria from one to five million—indicating very unsanitary milk. The samples taken from the heaters of the pasteurizers were 14 in number. Two of these contained bacteria of between two and five hundred thousand, and four bacteria from fifty to one hundred thousand. These six samples indicated plainly that the processes of heating were ineffective. The failure to destroy bacteria in the milk must be reported as due not so much to lack of proper temperature on the part of the heating apparatus, for as the temperature seemed to be sufficient, the only remaining reason for these large number of bacteria after heating must be imperfect cleansing and sterilization of the apparatus.

Eighteen samples were taken from the holding tanks. Four of these contained bacteria between fifty and two hundred thousand, while eight contained bacteria between twenty-five and fifty thousand. These 12 samples all show plainly that the process of pasteurization was ineffective, since a first-class heating and holding process should result in milk which contains not more than ten thousand bacteria. Since the temperatures on most of these machines seemed to be sufficiently high, the chief reason for the large number of bacteria must be due to imperfect processes of washing and sterilization of the pasteurizing apparatus.

The 22 samples taken from the cooling apparatus in the pasteurizing plants show the same indications of imperfections in the pasteurizing processes.

Passage of the milk from the cooler does not indicate any marked increase in the numbers of bacteria, there being 10 samples containing bacteria ranging from twenty-five to two hundred thousand, which corresponds rather closely with the bacteria in the samples for the holding process.

Samples of milk taken from bottle filling apparatus were 12 in all. Two of these contained bacteria between one hundred and two hundred thousand, one between two and five hundred thousand, and one between one and five million.

There were 46 samples taken from filled bottles after all processes were complete. Six of these contained from one to two hundred thousand bacteria; three from two hundred to five hundred thousand, and four from five hundred thousand to a million, and two from one million to five million, making in all 15 samples out of forty-six, or 30% of the bottled milk samples in excess of one hundred thousand bacteria. All of these were bottles of pasteurized milk and the large numbers of bacteria in them plainly indicate unsanitary conditions in the washing

and sterilization of the bottles themselves, as well as the apparatus in the pasteurizing plants. It is to be expected that a first-class pasteurizing process will produce a glass bottle of milk containing no more than ten thousand bacteria per cc. There are numerous pasteurizing plants in other cities consistently operating in this way, so that the milk sold from the delivery wagons contains not more than ten thousand bacteria per cc. It must be said that the pasteurizing plants of the City of Rochester are not controlled by bacterial tests made either by the dealers themselves or by the city Department of Health. The failure to regularly make control tests by taking samples of bacteria from these pasteurizing plants, undoubtedly prevents both the dealers and the Health Department from having any knowledge as to the efficiency of the pasteurizing processes.

What has been said regarding the large number of bacteria in the pasteurized milk in Rochester can be said with even greater emphasis concerning the bacteria in the raw milk of Rochester. While the inspectors did not take samples of bottled milk from the raw milk dealers, yet the samples taken from the cans of raw milk at the railroad platform plainly indicate what the character of the raw milk in bottles must be. Since the methods of handling milk by the raw milk dealers do not subtract in any degree from the numbers of bacteria contained in the cans received at the railroad; but, as a matter of fact, all of the processes of handling by the raw milk dealer necessarily add considerable numbers to the bacteria contained in the cans, the numbers of bacteria in the raw milk sold in bottles will be just as large and in many cases larger than were found in the canned milk as received at the railroad platforms.

PASTEURIZATION

Since the year 1900 when Nathan Strauss stood almost alone in openly advocating the pasteurization of all milk as a measure of public safety, there has been a steady growth of sentiment in favor of pasteurization, so that now the majority of the members of the medical profession who formerly opposed this measure have been won over to its favor. In like manner, practically every health officer of every large city in the United States and Canada, as well as in Europe, openly advocates pasteurization.

The National Commission on Milk Standards, chosen by the New York Milk Committee from the leading public health authorities in the United States and Canada, in 1912 at an official meeting passed the following resolution:

"The Commission thinks that pasteurization is necessary for all milk at all times, excepting certified milk, or its equivalent. The majority of the commissioners voted in favor of the pasteurization of all milk, including certified. Since this was not unanimous, the Commission recommends that the pasteurization of certified milk be optional."

As a result of this sentiment, all large milk dealers in the United States and Canada have installed machines for pasteurizing milk and pasteurize their entire supply, with the exception of a small amount of special milk at high prices, such as certified milk. The only raw milk sold in cities and towns outside of the small quantity of certified is the raw milk bottled by small milk dealers who cannot afford to install pasteurizing machinery.

New York City regulations require the pasteurization of all milk excepting that produced from dairies having cows which are tuberculin tested, employees who are free from disease, and from dairies which carry out exceedingly rigid sanitary precautions.

In Table No. 90 is a list of 18 cities of the U. S. and Canada which have passed milk regulations of their own, among which is a regulation requiring the pasteurization of all milk not coming from cows tuberculin tested, and otherwise protected against infection. It will be noted that the total population of these cities is 17,810,000, the total milk supply 5,503,000 quarts, and the total quantity pasteurized is 5,351,000 quarts, which is over 97%.

TABLE NO. 90

CITIES HAVING ORDINANCES REQUIRING PASTEURIZATION

NAME OF CITY.	Population.	Quantity milk sold.	Quantity pasteurized.	Total No. of dealers.	Dealers operating pasteurizer.
Sacramento, Cal.	70,000	24,000 qts.	22,000 qts.	12	6
Minneapolis, Minn.	400,000	140,000 "	126,000 "	50	30
Milwaukee, Wis.	500,000	192,000 "	188,000 "	42	35
Cincinnati, Ohio	425,000	120,000 "	120,000 "	65	65
Akron, Ohio	190,000	80,000 "	76,000 "	24	18
Toronto, Can.	500,000	192,000 "	192,000 "	80	80
Indianapolis, Ind	310,000	48,000 "	48,000 "	40	40
San Francisco, Cal.	500,000	128,000 "	120,000 "	25	12
Spokane, Wash.	140,000	28,000 "	24,000 "	4	4
Seattle, Wash.	400,000	84,000 "	64,000 "	51	15
St. Louis, Mo.	750,000	140,000 "	104,000 "	57	35
Los Angeles, Cal.	650,000	197,000 "	188,000 "	30	13
Philadelphia, Pa.	1,800,000	550,000 "	533,000 "	225	83
Baltimore, Md.	675,000	140,000 "	136,000 "	74	37
Detroit, Mich.	1,000,000	340,000 "	340,000 "	38	38
Chicago, Ill.	3,000,000	800,000 "	790,000 "	700	267
Cleveland, Ohio	1,000,000	300,000 "	300,000 "	250	250
New York, N. Y.	5,500,000	2,000,000 "	1,980,000 "	161	43
Total	17,810,000	5,503,000 qts.	5,351,000 qts.	1928	1071

In Table No. 91 is a list of twelve cities in the U. S. and Canada which have milk regulations not positively requiring pasteurization, but recognizing and defining it. This tabulation shows the population, the total quantity of milk and the total quantity of milk pasteurized. From this it will be seen that in these twelve cities there was 602,000 quarts of milk sold daily, 420,373 of which was pasteurized, amounting to 70%. If we compare with the above conditions, conditions in the City of Rochester, we must note that out of a total milk supply in August for Rochester of 77,579 quarts there were 44,160 quarts pasteurized, which is a little less than 57% of the total supply.

TABLE NO 91

CITIES WHERE PASTEURIZATION IS NOT REQUIRED BUT IS
RECOGNIZED AND DEFINED BY REGULATION

NAME OF CITY.	Population.	Quantity of milk sold.	Quantity of milk pasteurized.	Total No. of dealers	Operating pasteurizers.
Calgary, Alta.	67,000	16,800	16,320	2	2
Canton, Ohio	85,000	22,000	16,800	30	4
Rockford, Ill.	75,000	18,600	13,953	20	7
Winnipeg, Can.	200,000	57,600	36,200	104	2
New Orleans, La.	400,000	64,000	28,000	200	2
Omaha, Neb.	240,000	79,000	19,500	128	2
Hamilton, Ont.	110,000	30,000	24,000	25	10
Toledo, Ohio	300,000	50,000	30,000	25	5
Columbus, Ohio	300,000	60,000	48,000	44	14
Washington, D. C.	475,000	160,000	155,000	..	..
Duluth, Minn.	100,000	18,000	13,600	90	1
	2,352,000	576,000	400,373		

The evidence which is available regarding the value of the pasteurization of milk is now so abundant that it would be impossible in a survey of this kind to more than hint at the character or value of this evidence. Almost without exception every prominent health officer and sanitary scientist in the world is now on record in favor of pasteurization of public milk supplies, and the practice has become established not only by the industry for economic reasons, but under the auspices of municipal health departments for public health reasons.

TESTIMONY OF DR. W. A. EVANS

One of the most distinguished public health authorities in America is Dr. W. A. Evans of Chicago. He holds the position of health editor of the Chicago Tribune, and his writings in this paper are syndicated in

twenty other large papers in America. He also occupies the position of Professor of Hygiene and Sanitary Science in Northwestern University Medical School. He was Health Commissioner of the City of Chicago from 1907 to 1911 inclusive, President of the American Public Health Association, 1917, is a member of the Executive Committee of the Chicago Welfare Society which operates infant milk depots in Chicago, and a member of the Medical Advisory Commission of the Council on National Defence. He is one of the most prominent writers and lecturers on public health in this country.

DR. EVANS appeared as a witness at a public hearing held in the City Hall, Rochester, October 7th, 1919. His testimony in part was as follows:

Q. During your period of official connection with the Department of Health in Chicago as Health Commissioner, was the subject of the control over the milk supplies of the City of Chicago a subject which came up for consideration?

A. It was.

Q. Will you state in your own way what consideration was given to the subject at that time, and what you did?

A. The question of the mortality rate amongst infants was quite unsatisfactory, and it was one of the first things to which I gave attention when I assumed the duties of the office in 1907. I came to the conclusion that the milk supply was the most important factor in the situation and I conducted an investigation of the milk supply of Chicago and of other cities throughout the country with a view of determining upon a policy for the control of the milk supply. As the result of about a year's study, we came to the conclusion that the milk supply should be controlled by tuberculin testing and pasteurization, and so in July, 1908, we passed the Chicago ordinances requiring pasteurization, which ordinances have served as the basis for most of the milk ordinances passed by municipalities since that time.

Q. So far as you know, that was the first time that any American city passed such an ordinance?

A. I have always understood so, and I believe it to be a fact, that the ordinance passed in Chicago in 1908 was the first ordinance certainly of any large city, or city of importance, requiring pasteurization, making pasteurization compulsory.

Q. What were the reasons why you yourself favored the passage of such an ordinance in Chicago?

A. In the first place, it seemed to me that there was no other way to prevent the spread of milk-borne contagion, brought into the city where there was considerable distance between the point of production of milk

and the point at which it was used. It might be possible to prevent the spread of contagion of milk in a community where milk was produced on the same premises where it was consumed, or in close proximity thereto; but in market conditions where the producer was out of range of the consumer, no other way of preventing the spread of contagion by milk was feasible. That was my conclusion of 1908 when the ordinance was introduced, and I am more firmly of my opinion now than I was.

Q. Did you have any reason to believe at that time that the milk supply was any worse than the milk supply of other cities?

A. No, I had rather thought that we had a better average milk supply than the milk supply of other cities. Since 1892, the city of Chicago has always had milk inspectors and laboratory control of the milk supply. In 1904 the city inspection service was supplemented by a country, or farm inspection service. Since 1904, Chicago has had for the control of its milk supply, an inspection service within the city limits, laboratory control, and a country or farm inspection service. All three of these services were in operation in 1907 and 1908, the period in which I was investigating the question and arrived at the conclusion as to the proper remedy.

Q. Then you did not consider that the control of the milk supply by the use of city inspectors and country inspectors and laboratory was sufficient to safeguard the milk supply for Chicago?

A. I did not then, and I do not now. I am very emphatic in my opinion on that point.

Q. Had Chicago any time before or since the period you mention, suffered from epidemics of disease traceable to milk?

A. It had periodically. Before 1907, and from 1907 to about 1915, we would uncover some epidemic of some kind or other, in which it was possible to positively demonstrate that the disease, the epidemic, had been spread by milk. In addition, there were reports of other instances in which we believed milk to be responsible for these diseases, in which we were not able to furnish convincing proof. It was our belief, but we could not demonstrate it. Confirmation of the validity of that opinion is had in the fact that since pasteurization became universal in 1917, there has been no milk-borne epidemic in that city. Furthermore, the general rate amongst certain diseases that are frequently milk-borne, has continuously declined. The death rate in Chicago since 1915 from typhoid fever has been at no time higher than 1.07 per 100,000.

Q. Is that a very low rate compared with the rate in other cities?

A. It is the lowest American rate, and the indications are, unless something very inopportune should happen in the remaining months of 1919, that the rate of 1919 will be much the lowest rate in the world. Not all of that is due to the pasteurization of the milk. The water supply

is purer than it was before; the disease is better controlled; but one of the considerable factors is the fact that the entire milk supply, with the exception of a small amount of milk that is sent in, is pasteurized not only by ordinance, but is under observation of inspectors and under laboratory control. As I have just stated, the Health Commissioner makes the statement that the number of milk-borne epidemics has been decreasing, almost in proportion as the milk supply became pasteurized, and there has been no milk-borne epidemic of any kind or sort, since all of the milk has entered the city going through the pasteurizing plant.

Q. Are you familiar with the circumstances surrounding the epidemic of septic sore throat that occurred in Chicago about 1911 or 1912?

A. In the winter of 1911 and 1912.

Q. Will you state briefly the circumstances of that epidemic?

A. The epidemic occurred among the patrons of one dairy in the greatest part. It was clear as the result of the investigation, that the epidemic originated among the patrons of one dairy. That there was connection between this epidemic of sore throat and the milk supply, there was no question. The difference of opinion arose as to how the infection happened to occur.

Q. What was the nature of this disease you called sore throat; was it ordinary sore throat?

A. No, it is a disease that is generally known as septic sore throat. My recollection is that there were several thousand cases that were reported as cases of septic sore throat.

Q. Do you remember whether there have been other epidemics of that same character traced to milk in America?

A. Many such.

Q. Large epidemics of septic sore throat?

A. Large epidemics of septic sore throat, traced to infected milk supply.

Q. But you do not think that if the milk has been properly pasteurized it is possible for the milk to carry such infection?

A. I do not.

Q. Do you think pasteurization destroys the infection?

A. I do, and I think it is the only method of preventing just that accident. There is but one practical method of preventing human beings from consuming milk containing streptococci and that is by pasteurizing the milk, or otherwise cooking it.

Q. That is, you feel from your knowledge and experience the examination of cattle by veterinarians, the ordinary physical examination, is not sufficiently accurate to determine whether dairy cows are infected

with this germ or whether they have udders which are discharging the bacteria which might cause this disease?

A. I would say so. I would amplify that to this extent, as I have just said, a great deal has been written on the subject, many studies have been made; there is no unanimity of opinion on it. The only safeguard from the consumer's standpoint is to assume that there is no clinical method of telling whether the milk that comes from a particular cow contains streptococci or not, as the cow passes it, as it is milked. A health officer in my judgment in the present state of the case, is bound to proceed upon the theory that there is no practical method of telling which milk contains streptococci, and which does not.

Q. Do you know whether such soreness or disease in cows' udders is fairly common?

A. It is.

Q. Do you look upon it as a constant menace to a community, the presence of streptococci in milk?

A. Yes, I do.

Q. Do you think that the marketing of raw milk in a community carries with it that constant threat?

A. I do. From the infection of cows do you say; one of the threats that I had in mind in advocating the ordinance of 1908, and in standing for similar procedure for all cities since 1908.

Q. You have been advocating pasteurization for all other cities since 1908?

A. I have.

Q. Have there been many scarlet fever epidemics traced to milk?

A. A very sad number. My interest in the subject immediately arose from a very extensive, most extensive epidemic of milk-borne scarlet fever occurring in Chicago—or beginning in Chicago, in about February, 1907, and extending until about May, in which there were many thousand cases of disease and in which the disease was very definitely traced to milk.

Q. Do you consider the observation or the safeguards which can be cast around the employees connected with dairy farms and milk distribution by any medical inspection, or inspection by milk inspectors, is sufficient to prevent human infection from getting into milk?

A. I don't, for the reason that most of the infection, certainly of the milk supply, is done by people who are not clinically sick. That is the people who infect the milk in the main are people who are carriers, are not people who are clinically sick of the disease that they are transmitting to the milk. I remember particularly one family in the southwest part of Chicago, the B. family, who were responsible for several epidemics in my administration, and in a succeeding administration. In no

instance did we find the disease typhoid fever being imparted to the milk by people who were sick. There were carriers in this family, and these carriers were infecting the milk. The same thing holds true of every disease. The septic sore throat, diphtheria disease, is imparted, or the bacilli are imparted to the milk by people who are not sick, who are clinically well, and would be passed as well by any inspectors from the Health Department.

Q. Pasteurization is a barrier against this infection?

A. It is; commonly speaking, it is a "Safety First" procedure.

Q. Will the numbers of bacteria become very large indeed in raw milk, if it is not kept very cool?

A. Thousands of millions; uncountable numbers.

Q. What is the effect of pasteurization on these large numbers of bacteria that come into the milk from contamination with dirt?

A. The ordinance in Chicago specifies that the pasteurization must kill 99% of all the bacteria and 100% of what ordinarily are referred to as the disease or pathogenic bacteria.

Q. You look upon pasteurization as a safeguard for infants and children?

A. I do.

Q. Now, in recommending the adoption of such an ordinance for Chicago, do you take into consideration the opinion of some scientists and medical men that the pasteurization of milk may damage its food value?

A. I did.

Q. What is your attitude on that?

A. That was a question that I investigated very thoroughly, and went around to many different cities and talked with health officers of those cities and with children's specialists practicing therein. I also conferred personally and by letter with children's specialists in Chicago and in many parts of the country. The prevailing opinion at the time the ordinance was passed, was that the process of pasteurization decreased the food value of milk; decreased perhaps in some slight measure the direct food value, but harmed milk in that it tended to increase the amount of scurvy and rickets said to be produced by milk. As the result of my investigation I came to the conclusion that there was no basis for that opinion and had no hesitation in so advising the City Council of Chicago and the people through the public press and otherwise. There has been no increase in scurvy or rickets in Chicago. My judgment is that the process of pasteurization, its very general adoption as a community problem makes no particular difference with regard to scurvy. I am a member of the Executive Committee on the Medical Board of the Infant Welfare Society in Chicago. All of our babies that are not breast fed are

fed pasteurized milk or other forms of milk which has been heated. We hear nothing at any of our 23 stations about increase of scurvy, mild or severe, as the result of feeding pasteurized milk.

Q. Has pasteurization been adopted by many other American cities since Chicago adopted it?

A. It has.

Q. Has pasteurization been followed by the reduction of the milk-borne diseases in other cities as well as in Chicago?

A. It has. Another of the arguments used was that it put a premium on uncleanly methods in the dairy farms and in the milk depots in the city. The fact that people spent money to purify milk, that fact that these large establishments were constructed, were visible, were seeable, acted as an educational influence on the farmers. The farms and the dairies are cleaner now than they were before that ordinance, and in my judgment pasteurization has been one of the factors in bringing that about; not the most important, but one.

Q. Is there anything that the health officer of a city can do to prevent the pasteurization being used as a substitute for sanitation or as a substitute for cleanliness?

A. Oh, yes. In the first place, they have dairy inspection in the country and dairy inspection in the city; and they have laboratory control. The ordinances, all of them that I am acquainted with, specify that the milk before pasteurization, must conform to certain requirements, both as to bacterial count, and as to the sanitation of the place where it is produced and marketed. All of these are measures to prevent the marketing of very bad milk by pasteurizing it.

Q. You think that an ordinance requiring the pasteurization of milk should include some standards for the milk before it is pasteurized?

A. I do. There are such in the Chicago ordinances; I think in practically all of the ordinances requiring pasteurization; all that I have knowledge of.

Q. That is to say, you think that the milk has to qualify as to character in order to be fit for pasteurization?

A. That is correct.

Q. Now, in Chicago, do the inspectors of the Health Department go into the pasteurizing plants in order to see whether pasteurization is properly carried out?

A. The custom in Chicago is to have all the plans for pasteurizing plants brought into the department to be passed upon there; so that the plans must first be approved of by the department. I don't think that that is required by the ordinances, but that is the custom, whether it is required or not.

Q. Do the inspectors take samples of the milk before it is pasteurized?

A. Before its pasteurization and after pasteurization; and then on occasions they take it at other steps in addition.

Q. Their object is to determine the efficiency of the process?

A. The ordinance requires that the apparatus used destroy 99% of all the bacteria, and all the pathogenic bacteria.

Q. Are you familiar, Doctor, with the opinion of other experts in the United States and Canada, men who are making a profession of public health work, on this same subject?

A. I am.

Q. You said you were a member of the Commission on Milk Standards, New York City. Does that Commission in your opinion contain men who are qualified to pass expert judgment on such a subject as this?

A. It does; I think so. Its personnel was very carefully selected. I think it is a very well balanced Commission.

Q. How many members are there of that Commission?

A. The membership changes; slightly less than 20.

Q. Were you the first chairman of that Commission?

A. I was.

Q. Do you know whether the Commission of 20 men are unanimous in their opinion as to the desirability of the adoption of pasteurization by cities and towns?

A. I do. The question has been voted on a half dozen times in one way or another since 1911. There is absolute unanimity of opinion as to the desirability of pasteurizing the general milk supply of the Community. The vote on that question is always unanimous. We have up every year, the question of the advisability of obligatory pasteurization at all times of certified milk, and on that question we generally vote about half and half. On the matter of pasteurizing the general milk supply the vote is always unanimous and has been since about 1912.

Q. Do you consider that the personnel of that Commission justifies the conclusion that they are as well qualified as any commission that could be selected to pass on such a question as the adoption of pasteurization by municipalities?

A. My opinion is that it is the best opinion available in America.

Q. You don't think you could get any better opinion as to whether pasteurization should be adopted?

A. My judgment is that it is the best that can be had anywhere for that matter—I said "America."

Q. Do you know whether the findings of that Commission have been adopted anywhere?

A. Yes, they have been very widely adopted, changed as to details to suit local communities; but the general trend of their conclusions has been the basis of every ordinance that has been passed, that I know of in this country in the last seven or eight years.

Q. Who are the prominent authorities in the country who oppose pasteurization; are there any?

A. I don't think of any.

Q. Has there ever been any opposition to pasteurization in your Commission of the New York Milk Committee?

A. Well there was in 1911, but there has not been since 1911.

Q. Do you know any health authority in the country who has opposed pasteurization?

A. Well, the only one that I know of in the country is Dr. Goler of Rochester. He was a member of the Commission in 1911, and when the proposition to endorse pasteurization was up, he voted against it, and everybody else voted for it; and my recollection is that there were 22 members of the Commission at that time, and the vote was 21 to 1; and then he did not like it; quit and went home.

Q. Did he retire from the Commission then?

A. I so understood.

Q. He attended no other meetings?

A. He has never been a member since, and I understand he sent in his resignation and went home.

Q. Do you believe in pasteurizing certified milk?

A. I do. I voted for it. I mentioned the fact that we voted on it a great many years, and I am one of those who has constantly voted for it. I voted every time it has been up. Our agreement was that we would not abide by a majority vote on that proposition; that we would not recommend it as one of the recommendations of the Commission on Milk Standards unless there was an overwhelming opinion. And, therefore, as I said a moment ago, though there were many majority votes in favor of it, we have never recommended it as a compulsory requirement.

Q. As a matter of fact, milk supply is the most important problem before the people of any food problem?

A. The most important.

Q. Yes?

A. Oh, it is 90% of the health problem of the food question.

Q. And it is the most difficult problem?

A. All other foods combined do not make up more than ten per cent. of the problem.

REPORT OF MEDICAL OFFICER OF HEALTH OF THE
CITY OF TORONTO, CANADA.

In a report published in 1915 by the Medical Officer of Health of the City of Toronto entitled, "The Safeguarding of Toronto's Milk Supply, with Special Reference to Pasteurization," there is contained a most concise summary of the more important facts to be considered in connection with the pasteurization of milk. After pointing out the great value of milk as a food, the report discusses the dangers of milk briefly as follows:

"(1) DANGERS FROM BOVINE TUBERCULOSIS.

The total number of tubercular persons examined in the Research Laboratory of New York City relative to type of tubercle bacilli was 438; and of these, 32, or $7\frac{1}{3}\%$, had tubercle bacilli of the bovine type (contracted from the cow).

The 438 persons were divided into three groups, according to age:

- 1st. 297 persons, 16 years of age or over, among whom only one, or less than $\frac{1}{3}$ of 1%, showed bovine tubercle bacilli.
- 2nd. 54 persons between 5 and 16 years of age, among whom 9, or $16\frac{2}{3}\%$, showed bovine tubercle bacilli.
- 3rd. 84 children under 5 years of age, among whom 22, or $26\frac{1}{5}\%$, showed bovine bacilli.

The foregoing cases, with the addition of the total number of those examined by other investigators (which Dr. Park accepted as reliable after a careful analysis), total 1,038; and of this number 101, or $9\frac{7}{10}\%$, showed tubercle bacilli of the bovine type. If the 1,038 cases are divided into three groups according to age we have the following:

- 1st. 686 persons, 16 years of age or older, among whom 9, or $1\frac{1}{6}\%$, showed bovine tubercle bacilli.
- 2nd. 132 persons, between 5 and 16 years of age, among whom 33, or 25%, showed bovine tubercle bacilli.
- 3rd. 320 persons, less than 5 years, among whom 58, or $26\frac{1}{5}\%$, showed bovine tubercle bacilli.

Dr. Park made the following significant statement which is contained in a recent annual report of the United States National Association for the Study and Prevention of Tuberculosis:

'When the diagnoses of cases entering Mt. Sinai Hospital and the Babies' Hospital of New York, were examined, it was found that the majority of cases of meningitis, supposedly due to the meningo coccus, were really tubercular in character. Fifteen per cent. of the cases of broncho-pneumonia and marasmus were also found to be cases of tuberculosis.'

The report also quotes the findings of such leading authorities on tuberculosis as Dr. Ravenel of the University of Missouri; Professor Sims Woodhead of Cambridge University, England; Professor Delepine of Manchester, England; Professor Bang of Copenhagen; and summarizes their statements as follows:

"The uniformity of the findings of all these investigators is inspiring and convincing, their conclusions being that, conservatively estimated, *twenty-five per cent. of all cases of tuberculosis under 16 years of age is of the bovine type.* It is apparent then that tuberculosis, as contracted from cows through the medium of their milk, exists in children to a degree that cannot be longer disregarded by Departments of Public Health, and demands immediate action.

To attempt to remove this danger of bovine tuberculosis by excluding from dairy herds all cattle suffering from tuberculosis would mean a milk famine, the cost would be prohibitive, and even then the milk would not be safe without pasteurization."

The report then refers to typhoid fever, scarlet fever, and diphtheria, as follows:

"(2) TYPHOID FEVER.

The following table has been taken from a pamphlet recently issued by Dr. Charles E. North, Consulting Sanitary Expert, and Secretary of the Commission on Milk Standards, New York City.

This table represents a few only of the 317 outbreaks of typhoid fever traced to raw milk:

Glasgow, Scotland.....	500	cases from one raw milk supply.
Cologne, Germany	270	" " " " " "
Port Jervis, N. Y.....	59	" " " " " "
Springfield, Mass.	182	" " " " " "
Oakland, Cal.	262	" " " " " "
Montclair, N. J.....	107	" " " " " "
Stamford, Conn.	307	" " " " " "

These would have been prevented by pasteurizing the milk.

(3) SCARLET FEVER.

125 epidemics of scarlet fever traced to raw milk supply, of which the following are a few examples:

Buffalo, N. Y.....	57	cases from one raw milk supply.
Washington, D. C.....	33	" " " " " "
London, England	284	" " " " " "
Beverley, Mass.	6	" " " " " "
Liverpool, England	59	" " " " " "
Mt. Vernon, N. Y.....	45	" " " " " "
Boston, Mass.	195	" " " " " "

Pasteurization is the only means by which this danger can be eliminated.

(4) DIPHTHERIA.

51 epidemics of diphtheria have been examined of which the following are a few illustrations:

Brooklyn, N. Y.....	12	cases from one raw milk supply.
Los Angeles, Cal.	35	" " " " " "
Wellsville, N. Y.	84	" " " " " "
Clinton, Ohio	36	" " " " " "
Highpark, Mass.	69	" " " " " "
Warwick, R. I.	64	" " " " " "

No epidemics have thus far ever been traced to pasteurized milk.

(5) SEPTIC SORE THROAT.

Considerable interest has been aroused during the past four or five years as the result of a high mortality due to septic sore throat. Many of these outbreaks have been traced directly to the milk supply, partially through contamination by the handlers of the milk, who were affected or were carriers, and partially through an organism which is found in the diseased udder of the cow. Six hundred cases of sore throat in Stockholm in 1908 were traced to an abscess in the udder of a cow, which contained the same organism that was found to be responsible for the sore throat. This animal was one of a herd that furnished milk to those that became infected. This was one of the first observations made in this connection, and different outbreaks have been traced to this source since.

A very exhaustive study was given to the outbreak in Boston in May, 1911, where 1,043 cases were traced to one raw milk supply. In Chicago, Ill., an outbreak of 10,000 cases was traced to one raw milk supply; in Baltimore, 602 cases; and in Cortland-Homer, N. Y., 669 cases. This disease seems to attack adults especially.

Pasteurization would have made these outbreaks practically impossible.

It was on these findings, together with the information already in the possession of the Board of Health of New York, that they decided to pass an ordinance in 1912, requiring all milk not coming from cattle free from tuberculosis, as determined by the tuberculin test, and not produced under conditions necessary for the production of a certified milk, to be scientifically pasteurized. This ordinance was not rigidly enforced until 1914. That it has been for the past year rigidly enforced is evident from the following extract taken from the Weekly Bulletin of the Department of Health of New York City, June 6, 1914:

'The situation regarding compulsory pasteurization of all except the highest grade of milk sold in this city is extremely satisfactory, at the present time, *about 99% of the city's supply being efficiently pasteurized.* This represents an enormous improvement over conditions a year ago, and should make milk-borne disease a rarity in this city.'

The author, Dr. Charles J. Hastings, Health Officer of Toronto, then apologizes for presenting further arguments in favor of pasteurization by saying:

"In all advances of science there are always a few who cannot keep pace with advancement, and they expect others to wait for them. It is therefore necessary to repeat and repeat over and over again.

I am reminded here of Lord Cromer's address at the Annual Conference of the British Research Defence Society in London in July, 1910, when the question of inoculation of animals was under discussion, in which he said:

"It seems unfortunate that we should have to waste time on problems that are so self-evident, in order to meet the objections of those who value the life of a guinea pig higher than that of a baby."

He consoled himself by quoting the statement made by Mr. Cobden in the British House of Commons when endeavoring to bring about the repeal of the Corn Laws, which was as follows:

'I have come to the conclusion that the only way to get an idea into the heads of the British public is to repeat the same thing over and over again in slightly different language.'

This finds a fitting application in our present educative campaign in the necessity for pasteurization."

(6) EFFECTS OF PASTEURIZATION ON MILK

"The work done at that time by Schroeder and Cotton in connection with the experimental stations of the Bureau of Animal Industry was most valuable and has frequently been quoted since. They demonstrated that tubercular cattle discharged tuberculosis germs from their bowels almost constantly—at times to the extent of tens of millions per day.

In demonstrating the efficiency of pasteurization, so far as the tubercle bacillus is concerned, they inoculated several hundred guinea pigs with the milk in its raw state from these tubercular cattle. Every one of the little animals showed general tuberculosis. Over 200 guinea pigs were injected with milk from the same cow after it had been pasteurized at a temperature of 140 degrees for thirty minutes. Not one of these developed any signs of tuberculosis."

The author gives the names of numerous other authorities who have confirmed this work.

He then submits statements from numerous authorities regarding the chemistry of milk showing that the temperatures used in pasteurization do not damage milk in any way or change its chemical condition. Among other statements as to the food value of pasteurized milk is the following:

"In a recent careful study carried on in Washington 351 babies fed on raw milk gained on an average of .4030 oz. a day, while 557 babies fed on pasteurized milk gained on an average of .4077 oz. One hundred and ten babies were fed for part of the time on pasteurized milk. During the raw milk period they gained on an average of .4312 oz. and during the pasteurized milk period an average of .4607 oz. Some of the leading authorities in England and United States are now advocating the use of boiled milk, the digestibility of which one might possibly suspect as being unfavorably affected.

Dr. North in referring to the digestibility of pasteurized milk gives the following practical evidence:

'Fortunately New York City has the past three years carried out a gigantic experiment in infant feeding at its fifty-five (55) municipal milk depots, where babies are fed the year round, to the number of 18,000 daily in summer and 16,000 daily in winter. For three years all of this milk has been scientifically pasteurized. Records have shown that the babies have gained weight; have kept well; have shown no signs of rickets or scurvy, and in every way gave evidence that pasteurized milk is not inferior in food value or digestibility to raw milk.

'The death rate among infants during this period has been reduced from 125 per thousand to 94 per thousand, which places New York City in the lead of any large city in the world in the reduction of infant mortality.'

Numerous other instances could be quoted of the unchanged nutritive value of pasteurized milk, but the foregoing are more than sufficient to demonstrate this fact.

It was with a knowledge of these facts that the International Congress of Tuberculosis held in Washington in 1908, unanimously passed a resolution that

all milk not coming from herds shown to be free from tuberculosis, should be scientifically pasteurized. The National Association for the Prevention of Tuberculosis, the Canadian Association for the Prevention of Tuberculosis, and the Canadian Medical Association subsequently passed similar resolutions.

It was with a knowledge of the dangers of transmission of tuberculosis, together with the dangers of the transmission of other communicable diseases and the dangers of diarrhoeal diseases through raw market milk, that prompted the Committee on Milk Standards, and subsequently, the American Public Health Association and the American Medical Association, as well as the Association of State and Provincial Health Officers, to pass a resolution that all milk not coming from herds free from tuberculosis, as demonstrated by the tuberculin test, and not obtained under conditions corresponding to those required for the production of certified milk, should be scientifically pasteurized before being used for human consumption.

At the International Pure Milk Congress held in Brussels in 1907, the use of raw milk for infant feeding was officially condemned and pasteurization advocated.

It was with a knowledge of these facts that the Minister of Agriculture for France in 1912 had legislation passed prohibiting the sale of any milk in France that had not been properly pasteurized. The Minister of Agriculture had behind him in this move a solid block of all the scientific and legislative powers, including: Professor Bordeau, of the College of France; Professor Metchnikoff of the Pasteur Institute; the President of France, the Deputies, the Senators, the Ministers, the Pasteur Institute, the College of France, and the Medical Faculty.

Prof. William T. Sedgwick of the Massachusetts Institute of Technology, and President-elect of the American Public Health Association, says: 'I have long been a believer in the necessity of pasteurization and went on record to this effect in my first paper on milk supply and public health in 1892, reiterating the same views in Sanitary Science and Public Health the same year. The opinion then expressed I hold substantially in the same form and for the same reasons today.'

Denmark, the country that practically leads the world in dairying and in efforts to control tuberculosis amongst cattle and hogs, goes so far as to require that all skimmed milk and buttermilk required for the feeding of animals must be pasteurized, and also all cream used for the manufacturing of butter or ice cream.

One of the most valuable advances towards the more general control and safeguarding of the milk supply in the United States and Canada was the appointment of the Commission on Milk Standards. The appointment of this Commission was the direct result of the observations of the New York Milk Committee, that there was great incompleteness and lack of uniformity in the milk standards, milk ordinances and rules and regulations of public health authorities throughout the country for the control of public health supplies.

In the report issued by this Committee, regulations of standards were published to govern milk supplies in the various municipalities permitting of modifications to meet certain local conditions. The one recommendation, however, which was universal was that all milk not coming from tuberculin tested cattle and procured under the conditions necessary for the production of a certified milk, should be efficiently pasteurized.

As has been recently expressed in the New York Medical Record:

'The antiquated, fetish-like arguments against pasteurization, like floating corks, keep bobbing above the surface; but pasteurization has come to stay, and its success in everyday practice, year after year, and in the case of thousands upon thousands, yea, hundreds of thousands of infants whose lives have been saved by it, should quiet all hostile arguments.'

TESTIMONY OF MR. J. H. LARSON

MR. J. H. LARSON, Secretary of the New York Milk Committee, appeared as a witness for the Survey at a hearing held in the City Hall, Rochester, on September 16, 1919, and testified on the subject of pasteurization as follows:

Q. Now, Mr. Larson, your work as Secretary of the New York Committee has made it necessary for you to keep in touch with the general milk problem in other cities of the United States, has it not?

A. We very often receive requests for co-operation or for suggestions for milk control.

Q. But in a general way do you make it your business to keep posted as to the progress in milk improvement in other cities of the United States and Canada?

A. We make it a business to take an interest in them. We do not keep an actual tabulation of facts.

Q. During the period you have been employed by the Milk Committee do you know whether or not there has been a tendency on the part of cities in the United States and Canada to adopt pasteurization of milk?

A. Yes, there has been.

Q. Do you think it is a good thing for any city to make pasteurization compulsory?

A. I believe it is.

Q. You believe it is?

A. Yes.

Q. Do you think that it adds to the safety of milk to pasteurize it?

A. Yes, I believe it does.

Q. Do you think that raw milk is not sufficiently safe without pasteurization?

A. Milk, though it is the best food we have, is also the best medium we have for carrying germs of infectious disease; bacteria grow in milk, and epidemics, typhoid, scarlet fever, sore throat, etc., all have been milk-borne, and that I have taken a part in investigating. I cannot feel that any raw milk is safe.

Q. Will you mention one epidemic that you personally have investigated which makes you think that raw milk is unsafe?

A. Well, there was an epidemic at Cortland, New York.

Q. What did you find there?

A. This was an epidemic of septic sore throat. It was found that the infection came from the udders, I think, of two cows. Laboratory tests revealed this infection; but not until, I believe, there were upward of 600 cases.

Q. Six hundred cases of what?

A. Septic sore throat, very severe cases. We had twelve deaths; one banker among them, a prominent citizen.

Q. Where did this milk come from?

A. From a small producer outside of the city.

Q. How was it distributed?

A. I am not positive whether it was distributed loose or in bottles.

Q. Was it distributed by the producer?

A. I believe it was; yes.

Q. Was it distributed only in Cortland?

A. No, it was distributed also in Homer.

Q. In the town of Homer?

A. Yes, two miles from Cortland.

Q. Was there an epidemic there also?

A. Yes, sir.

Q. At the same time?

A. Yes, and same cause.

Q. What reason had you to believe that the epidemic was due to milk distributed by this farmer?

A. Because it was in the herd of this farmer that the diseased udders of the cows were found.

Q. Where were these cases found among the customers?

A. On the milk route of this distributor.

Q. Almost entirely confined to those people?

A. The outbreak of the epidemic followed his routes; there were many of course, contact cases.

Q. But most of the cases—

A. Most of the cases were on this route. The statistical evidence pointed absolutely to this possible source of infection. After that, the problem was to find out what was the cause of this infection and that was done as I said, and the bacteria found in those udders were the same, as found in the throats of the people who had this disease.

Q. Do you know what the attitude of the health officers and medical men of that town was?

A. Yes. This was raw milk and raw because of the opposition of the medical authorities and profession of the municipality to the pasteurization of milk because pasteurization was alleged to impair its food

value as well as to make it unfit for the delicate digestive organs of infants.

Q. Do you know whether the attitude of the medical profession of that city was changed any by this epidemic?

A. Yes.

Q. You think they changed their minds?

A. Yes.

Q. You think the medical men and health officer now favor pasteurization of milk?

A. Yes.

Q. Is it not a fact that after this epidemic they requested or asked whether some arrangement could not be made for pasteurizing milk for their city?

A. Yes.

Q. Was there any other epidemic or disease that you have investigated, due to milk?

A. Up until two years ago I had a part in investigating, I have perhaps for a period of four years, every epidemic in New York State that could possibly have a suspicion of being a milk-borne epidemic. I had a part in the investigation of septic sore throat in Poughkeepsie, New York, I think in 1915.

Q. Will you describe as nearly as you can just what the nature of the conditions were that you found in Poughkeepsie?

A. Do you mean community conditions?

Q. I mean the character of the epidemic and its outbreak?

A. That epidemic in Poughkeepsie was an epidemic that came out with a great deal of violence. The attitude on the part of the officials was that it was a rather minor epidemic of scarlet fever. I think the health officer had as many as eighty-two cases reported; something like that. I was asked to help on a field survey of this epidemic, and in going over the field, other investigators and myself found I think, nearly 800 cases of septic sore throat and scarlet fever in Poughkeepsie and the surrounding community.

Q. Describe just how these cases were divided up and what the evidence was that you secured as to the cause of the epidemic?

A. What do you mean by "division?"

Q. Please describe what you found as to the way the cases were divided geographically and what evidence you found as to the cause of the epidemic?

A. The first cases, or as it turned out later, the first case was found on a dairy farm near Wappingers Falls, south of Poughkeepsie; there was a small group of cases there.

Q. How far is that from Poughkeepsie?

A. About six miles ; another group, a larger group, at Poughkeepsie, and another group at the New York State Hospital, which is four or five miles north of Poughkeepsie. In tracing the original cases, it was found that those cases had onset—these three groups of cases had onset on approximately the same day. The Health Officers in each community were looking for the source of the epidemic, independently of the Health Officer of any other community.

Q. Did each one of those communities think they were having their own private epidemic?

A. Yes, and were busy looking for some manner of controlling it.

Q. They did not think there was any connection between the three of them?

A. No. Finally it was found that previous to the onset of the cases in these three communities, there was a case of a farm hand of one of the dairy farms supplying milk in the creamery at Wappingers Falls. This milk was traced to the consumers of Wappingers Falls and to the consumers in Poughkeepsie, and a part of the supply went up to the New York State Hospital.

Q. That is, this creamery shipped milk to those three places?

A. Yes.

Q. Was the milk pasteurized?

A. As I recall it, it was not pasteurized, or it was a case of the milk being imperfectly pasteurized through the breaking down of the pasteurizing machinery. It was not properly pasteurized.

Q. It was supposed to be pasteurized, but the machinery broke down?

A. Yes.

Q. It broke down at the wrong time?

A. Yes.

Q. It broke down as you found it, just at the time when scarlet fever existed on this farm that you refer to?

A. Yes.

Q. Do you know whether the people and Poughkeepsie and these other communities were in favor of pasteurizing milk before that time?

A. No, they were not.

Q. They were opposed to it?

A. They were strongly opposed to it.

Q. Do you know anything about their attitude since the epidemic?

A. Their attitude towards pasteurization was changed. Their attitude towards reporting communicable diseases was changed and toward their old health administration has changed; they now have a substitute one.

Q. Have you seen the records of outbreaks of infectious diseases in other cities, in other countries due to raw milk?

A. Yes, I have seen records of those.

Q. You have a list compiled, have you?

A. Not with me.

Q. But you have seen the records?

A. Yes.

Q. And it is on those records that you believe milk should be pasteurized?

A. Yes.

Q. In order to prevent those outbreaks?

A. No epidemic has ever been traced to milk that was properly pasteurized. Any number of epidemics have been traced to milk that was raw or improperly pasteurized.

MR. FRANK E. GANNETT, who appeared as a witness at a public hearing, held at the City Hall, Rochester, on July 23, 1919, gave the following statement:

I was much impressed too by Nathan Straus' book, "Disease in Milk, the Remedy, Pasteurization," written by his wife. And this book makes a very clear case out of his long experience in New York City Milk Stations; I believe, it extended over a period of twenty years, in which he reiterates again and again and again that the city's milk supply should be pasteurized in order to insure purity. And in the way of pasteurization I thought Rochester was far behind; in fact, in this book he gives a table showing that in New York City the pasteurization of the supply is 95%, while Rochester he gives only as 20%.

I think if the pasteurization was carried on in one or two or three central plants it might be done cheaper than in a dozen or so plants; and what would be a further advantage, the city could see that the pasteurization was properly done. This is just as essential as to have it pasteurized. I do not know that we have any protection now, or any guarantee, that the milk sold is pasteurized except the reputation of the dealer that handles it. We know that certain concerns are reliable and we depend upon them.

DR. JOHN R. WILLIAMS of Rochester, appeared as a witness for the Survey at a hearing held in the City Hall, August 13, 1919, and testified as follows:

Q. Do you think that the milk delivered by the small dealers is as safe as the milk delivered by the large dealers?

A. I do not.

Q. You do not, why not?

A. Well, I base my answer on my personal observations that I do

not think the small dealer exercises the precautions that he should in the handling of milk.

Q. What precautions do you refer to?

A. Well, I do not think they adequately wash and sterilize their bottles. I have caught small dealers on the street filling bottles out of cans and then taking them into the homes.

Q. Well, what is your opinion regarding the safety of the raw milk handled by the small dealer, even if he should properly sterilize the bottles, do you think that milk is safe to use?

A. I think not. We proved that in one investigation.

Q. How did you prove it?

A. I am sorry I did not bring that with me, notwithstanding, I think I can tell you in part. I was called one time to see a man in the northern part of the city; he was taken ill in a strange manner. To make a long story short, he was taken ill, very acutely ill, with the disease we could not recognize at the time. We made all sorts of examinations of him and many physicians were called into consultation and were not able to recognize the nature of his illness. In about three days another member of the family was taken ill in the same way. These two patients represented a condition which resembled typhoid fever. That is a disease that never had been discovered in this part of the country. We thought we were dealing with typhus fever and we sent to Washington with the approval of the Health Officer, and an expert was sent up here to assist in this investigation, Dr. Joseph Cole Parker, a bacteriologist of international reputation. With his assistance, or in fact, before he arrived, we determined the nature of this sickness. In the meantime, two other members of the family were taken sick. We had determined by this time that these were a very peculiar type of typhoid fever. These patients were covered with a rash which closely resembled measles; they were covered from head to foot. While we isolated the organism from their bodies which made them sick, it did not re-act to the usual typhoid tests, nor did it check up with other strains of typhoid organisms after the manner employed in typhoid diseases usually. The husband was sick with this disease for more than six weeks; the wife was sick, acutely ill, for eighty-three days and two other members of the family were sick for a shorter period of time. This man had a little tailor shop; it was necessary for him to employ all this time a physician; he had several; some of them he did not have to pay; he had to pay a very considerable physician's bill; but not for these investigations altogether. I estimated that—well, after the discovery that these people had typhoid fever, we set out to determine where it came from, and we found this man got his milk from a small milk dealer and the milk came from a farm out in Walworth, so I went out there and took paraphernalia with me and with

the co-operation of the Health Officer there, and here I got samples of blood, stool and urine from the farmer on this milk farm and from his daughter. Both of them gave a history of being sick; the father had had stomach trouble for several months previous, it was so diagnosed, and the daughter had just rallied from an attack of pneumonia. Both of these people were just alive with typhoid germs and this same peculiar strain. We brought these samples back to Rochester and established the fact that those two organisms were identical. I made a note of the location of cow barns and the privy house; the privy was mid way between the cow barn and the kitchen, and I have not the slightest doubt that there could be no question but what the filthiness of this farmer and the disease were connected. I made an estimate of the expense involved at the time to this little tailor's family and the other expense involved, and there was a loss of at least four thousand dollars in that one instance, doctor bills, nurse bills and so on.

Q. Do you consider that there is a common danger of that kind from raw milk delivered?

A. I do.

Q. By small dealers?

A. By all dealers, large and small.

Q. Do you think that Rochester is exposed to such dangers through the raw milk it receives?

A. I do.

Q. Does that include other diseases besides typhoid?

A. Yes, other diseases.

Q. What do you think ought to be done to make that milk safe?

A. Well, I pasteurize the milk in my home before I use it.

Q. Do you recommend that all citizens of Rochester should pasteurize the milk in their homes?

A. I do, at the present time, because there is no regulation requiring its being pasteurized.

Q. Would you be in favor of a regulation requiring that it should be properly pasteurized?

A. Yes.

Q. By the dealer?

A. Yes, under municipal supervision.

Q. Do you think that it would lead to the advantage of the citizens of Rochester from a public health standpoint, if Rochester had a regulation requiring the pasteurization of all its milk?

A. I do.

Q. Do you know approximately how much of the milk supply of Rochester is pasteurized at present?

A. I do not.

Q. You know that Rochester has no such regulations?

A. Yes. I know that the Health Officer is opposed to that.

Q. Do you think the advantages of pasteurized milk are greater than the disadvantages?

A. I do not know any disadvantages. I do not know any patent disadvantages. There are alleged disadvantages, but I do not know of any real objection to it.

Q. Getting back to pasteurization. The pasteurization of milk is now absolutely under the control and supervision of the municipality, is it not, in those plants that do pasteurize?

A. Theoretically it is; but practically I do not think so.

Q. Do they not maintain their heat, uniform heat, and is not that evidenced by automatic records in these plants that have to be turned into the Health Bureau?

A. I have no confidence in the way it is done; the Health Officer is not in sympathy with it. I would not say this, but I do not believe that the Health Officer pushes the matter. I do not think the thing is regulated or controlled the way it should be.

Q. He is not in sympathy with pasteurization at all?

A. No.

CERTIFIED MILK COMPARED WITH PASTEURIZED MILK

This testimony was given by Dr. Henry H. Covell of Rochester, Secretary of the Monroe County Medical Milk Commission, who appeared as a witness at a public hearing held in the City Hall, July 23, 1919. A part of his testimony was as follows:

Q. You are Secretary of the Monroe County Milk Commission?

A. Yes.

Q. What are the duties and objects of the Monroe County Milk Commission?

A. This Commission, appointed by the Monroe County Medical Association, has to do with the regulation and control of what is known as certified milk.

Q. Who are the other members of the Commission now?

A. Dr. J. W. McGill is the President of the Commission, and Dr. E. G. Nugent is the Treasurer. Other members of the Commission are Drs. J. R. Culkin, S. W. Little, Norris G. Orchard. There may be one or two more I do not recall at the present time.

Q. You spoke of some one being Treasurer. Does this Commission have funds?

A. Yes.

Q. Where does it get them?

A. There is a small charge from the producers for certifying.

Q. What does the Commission do with its funds?

A. Well, largely meets small matters of expense that they have; for instance, we pay the bacteriologist a small fee for his work.

Q. For examinations?

A. For examinations of milk. There are small matters of book-keeping—all outside. Largely questions of that sort—no salaries to anybody outside of the bacteriologist. If the report from the bacteriologist indicates conditions that are not satisfactory to the Commission, I, or the members of the Commission as well, get in touch with the producers, or visit the farms where the milk is produced and try to locate the difficulty.

Q. Now, the bacteriologist examines this milk for what purpose? What is the character of the examination?

A. He determines the number of bacteria per cubic centimeter; also the percentage of fat content; also, I suppose you might say, an ocular examination to determine whether or not visible dirt is present. Possibly, sometimes the temperature of the milk at the time of the examination may be taken, but those four things are the main divisions of his examination.

Q. These samples are furnished by dealers to the bacteriologist?

A. Through the medium of the distributor. I might say that among other things, the requirement is that the examination of milk to conform with these requirements, shall indicate a bacterial content of not to exceed ten thousand per cubic centimeter.

Q. How many farms produce certified milk to the City of Rochester?

A. Four at the present time.

Q. Does any veterinary make an examination of the herds?

A. Twice a year we have the cattle examined for tuberculosis and incidentally for other conditions that may appear. There is a vast difference between the production and handling of certified milk, and the production and handling of the ordinary grade of milk.

Q. Your certification of milk means then that the premises, cattle and conditions generally under which it is produced, are made the subject of examination by your Commission and that your Commission believes it to be safe for consumption?

A. Yes.

Q. Are the records of the tuberculin test that have been made on certified herds of Rochester kept on file?

A. Yes.

Q. Do they find re-actors?

A. Sometimes.

Q. Even after all their precautions have been carried out?

A. Yes.

Q. So that even after every precaution has been exercised, there is always a menace from cattle diseases?

A. Yes.

Q. Do cows frequently have sore udders?

A. In my limited experience I should say "Yes" to that.

Q. Is it not true that it is necessary to frequently examine a dairy herd in order to detect the presence of sore udders?

A. Yes.

Q. Would you look upon sore throats among dairy employees as a menace to the milk?

A. Yes, sir.

Q. Does your examination require that these employees should be healthy with reference to throat health or disease?

A. Yes.

Q. Well, what is your view regarding raw milk over which these precautions are not exercised; do you think that the milk is less safe than the certified milk?

A. I think it less safe.

Q. Do you think it is dangerous?

A. The possibilities are very great.

Q. Do you think the danger from cattle disease is very great?

A. Yes, sir.

Q. Well, do you think that cattle that produce the raw milk supply of Rochester are examined frequently enough to protect the raw milk supply from cattle diseases?

A. As a consumer of grade milk, or milk that is not certified, I must say that sometimes I have felt a little bit uneasy about the quality of milk that I have been receiving.

Q. Well, you look upon these precautions you speak of as necessary, you say, to safeguard raw milk?

A. I think so.

Q. Then, where they are not exercised, the raw milk is not sufficiently well safeguarded to be consumed in a raw condition?

A. I do not know exactly what to say in answer to that.

Q. Well, would you say that the public health was not properly safeguarded in a raw milk supply over which these precautions were not exercised?

A. In a general way, possibly so.

Q. You think there is danger in the fact that the raw milk is not safeguarded as well as certified milk?

A. I guess I can answer that question in the affirmative.

Q. Under those circumstances would you recommend the raw milk which does not receive such safeguards as certified milk, had better be pasteurized?

A. I think so.

Q. You look upon pasteurization as a proper public health measure?

A. I am in favor of it.

Q. To be applied to raw milk which is not protected as well as certified?

A. Yes.

Q. Would you recommend that all the children of Rochester should use certified milk?

A. Theoretically, I suppose "Yes"; but practically, it is too expensive.

Q. Well, what would you prescribe to the children of Rochester who cannot afford certified milk?

A. Apparently the only thing you could say would be "pasteurized milk."

Q. You would not prescribe raw milk?

A. I think not.

Q. You would prescribe pasteurized?

A. Yes.

Q. Do you think it would make the raw milk safer to pasteurize it?

A. I think it does.

Q. Is that of sufficient advantage to a community to justify a regulation requiring it?

A. I can imagine a situation might arise when that would be so.

Q. Would it be a constant safeguard that would be to the advantage of the city?

A. I believe so.

Q. There is no reason why reasonable sanitary precautions cannot be enforced in addition to pasteurization?

A. Not that I know of.

TESTIMONY OF DR. GEORGE W. GOLER

The attitude of the Health Officer of Rochester, Dr. George W. Goler, on the subject of pasteurization is indicated in his testimony delivered as a witness at one of the public hearings held in the City Hall on July 16, 1919, which was, in part, as follows:

"Then came the time of pasteurization. In our milk stations we tried to pasteurize the milk for a little while and then gave it up in disgust. We found that the milk that came to us was so dirty that we believed, by our advocacy of pasteurization, we were simply aiding the milk man in bringing into the city dirty milk and putting off the day to be hoped for, when milk would be sold so comparatively clean that it might be pasteurized. People ought to know in regard to the milk of Rochester, if there is only two grains in a quart of milk, that every year the population of Rochester are drinking three tons of liquid manure. We say that three tons of manure ought to be an absolute limit. We want the men to keep it on the farm. We don't want it in the milk. Without going into detail, that is the main reason why, so far as I personally am concerned, that I have always fought pasteurization, because pasteurization to me was very similar to that plan of putting a little formaldehyde in the milk to enable the milk man to bring it into town without spoiling, or that he might sell it without purifying it."

Q. You spoke about welfare stations. Tell us about those welfare stations.

A. In those stations in the first years, we pasteurized milk, as I say, but we gradually gave that up, because we felt that the milk was so dirty, that is, the general milk supply was so dirty—we could get clean milk in the city—if we gave to the people of Rochester the impress of our opinion that pasteurization was a desirable thing, we should then simply put off the day when milk would be clean enough to be favorably influenced by that kind of pasteurization, which should not be pasteurization for the sake of the milk man; but pasteurization for the sake of the family.

Q. Doctor, what is the object of pasteurizing milk?

A. There are several objects. The first object of pasteurizing milk is to make the milk so it won't spoil, and so the milk can sell. It is a milk man's process. The next object to pasteurize milk is to prevent dissemination of infectious diseases, typhoid particularly. And still another object is to prevent the multiplication of certain organisms which no doubt further aid in the production of acute bowel diseases of children. Those are the general objects. But the first object of pasteurizing—you don't want to lose sight of the fact that the pasteurizing

of milk was first for the purpose of making bad milk keep so the milkman could sell it.

Q. The pasteurization of milk consists in heating to 145 Fahrenheit and keeping it there.

A. I never attempted to develop it; but it is a sort of process—anything to heat the milk up to a temperature so the thing would keep in the beginning.

Q. But there is a standard temperature for pasteurization?

A. There is a standard temperature for pasteurization.

Q. 145 or 150 degrees which you have quoted?

A. And that process of pasteurization carried out as a supplementary measure is of value. The sanitary safeguards thrown around milk is a highly desirable procedure.

Q. Now, there are certain organisms that will not kill?

A. Yes, sir.

Q. But the organisms which develop infectious diseases like typhoid and septic sore throat and scarlet fever, it will kill if it is raised to that heat?

A. We don't know anything about scarlet fever, so we don't know whether it will kill scarlet fever or not. It does affect typhoid, of course.

Q. Now, you take the position, I understand, Doctor, that pasteurization is objectionable because dealers are likely to use it to cover up unsanitary milk and unsanitary conditions, to make dairy milk salable and more or less harmless?

A. Yes, sir. I won't subscribe to the latter part of that statement. If you mean the established method, a correct scientific method of pasteurization, then I will subscribe to the latter part of your statement.

Q. Then there is no objection to carrying out strict sanitary measures, and also pasteurizing milk?

A. Given strict sanitary measures and scientific pasteurization, of course.

Q. What are proper sanitary conditions?

A. I want as little cow manure—and every other city—as we can possibly find in it. As I said this morning, we ought not to have more than three-quarters of a ton of cow manure in our milk a year.

Q. What are the effects of cow manure in the human system?

A. I don't think it has been determined.

Q. It is a disgusting thought, isn't it?

A. Doubtless makes children sick. The poorer the care, the dirtier the milk. Clean milk and good care are rather companionable. Dirty milk and bad care—how much is due to dirty milk and bad care, and how much to clean milk and good care, nobody knows.

Q. There are various cities in this country about the size of Rochester or larger, that require that all milk should be pasteurized and sold as pasteurized milk?

A. Yes, sir. There are certain provisions in the State Milk Law of New York State which provide for it.

Q. That is required as to the supply of the City of New York?

A. I don't know.

Q. Philadelphia, how about that?

A. I don't know. I don't know about the pasteurization requirements relating to any city at the present time.

Q. Has there ever been agitation in the City of Rochester that you have known of, to get such a requirement in force?

A. Oh, yes. The milk ordinance of the City of Rochester is the milk statute of the state, the Statute of the State Department of Health, and that is complied with. Of course you know the State Department of Health has a splendid statute under which it graded milk, i. e., Grade "A" for Grade "A" people who had Grade "A" pocketbooks; Grade "B" for Grade "B" people who had Grade "B" pocketbooks; Grade "C" for Grade "C" people with Grade "C" pocketbooks. That is a fine ordinance. If you had Grade "A" water that would be Grade "A" water absolutely protected from typhoid, Grade "B" would be some other kind of water. Grade "B" water would be the water now fed to a lot of residents in the neighborhood of Manitou. I just saw a woman who had typhoid as a result of drinking the water down there. We should have a comparison between the milk graded in that way as in the case of water. A, B, C grades indicate degrees of wholesomeness. It indicates the degree of care which the milk has been put through and the degrees of care with which it has been handled.

Q. How do you feel yourself about the sale of raw and pasteurized milk?

A. I am in favor of the sale of raw milk until such time as sufficient sanitary safeguards are thrown around milk to make it safe for pasteurization. I have never been in favor of pasteurizing all kinds of milk as in the pasteurization craze which passed over Rochester.

Q. If pasteurization does do something towards rendering milk wholesome for human consumption, isn't it a mistake to delay pasteurization of the milk?

A. I don't think so.

Q. You advocate continuing sale of raw milk, which may contain those dangerous organisms which may be destroyed by pasteurization—to the people of Rochester?

A. I do.

Q. You would kill them?

A. No, it might contaminate them. It may kill a lot more people, and it may put off the evil day, as it doubtless does. Witness this hearing. I don't mean this is the evil day. This is one of the best milk days Rochester has had.

Q. What do you think ought to be done, if anything, to the regulations here in Rochester in order to improve the supply of milk?

A. Well, there are only some small though important changes in the regulations: those regulations for temperature, of the milk coming in; the regulation for a tubercular test; the better enforcement of the regulations relating to the cleanliness of dairies, so that one might bring it so that there were only two or three or ten per cent. that were below. Then, of course, the introduction of the ordinance for pasteurization.

In order to clear up any doubt in the minds of the Health Officers of the State of New York as to what is meant by the term, "pasteurization," and to remove any obstacle in the way of the adoption of pasteurization based on the ground that there are no standards for this process, the State Health authorities define pasteurization as follows:

"Regulation 12. Pasteurization. Except where a different standard of pasteurization has been adopted previous to the 1st day of September, 1914, by the local health authorities, no milk or cream shall be sold, or offered for sale, as pasteurized, unless it has been subjected to a temperature of 142 to 145 degrees Fahrenheit for not less than thirty minutes, and no milk or cream which has been heated by any method shall be sold or offered for sale unless the heating conforms to the provisions of this regulation.

After pasteurization, the milk or cream shall be immediately cooled and placed in clean containers and the containers shall be immediately sealed. No milk or cream shall be pasteurized more than once. This regulation shall take effect throughout the State of New York, except in the City of New York, on the 1st day of January, 1916."

Consequently, since the 1st day of January, 1916, the heating of milk or cream by any other process than the process above designated has been illegal, and it is proper therefore to assume that, if other processes of heating have been used in Rochester, or in any other municipality, since January 1st, 1916, the same has been due to wilful neglect of the enforcement of the State regulations, either by milk dealers or local health officers.

As previously stated, the City of Rochester has no milk regulations of its own. It has depended entirely upon the state regulations for the control of its milk supply. The attitude of the State Public Health authorities is one which makes it clear that cities of the first class are expected to pass regulations of their own which are most stringent than the state regulations. While the state authorities have given a clear

definition of pasteurization, yet the adoption of pasteurization by the cities of the state is entirely optional. Consequently, the fact that the City of Rochester has not adopted more stringent regulations since the state regulations were promulgated in November, 1914, and has not adopted any regulation requiring the pasteurization of milk since the state authorities defined pasteurization on the same date, is a responsibility resting entirely on the shoulders of the public health authorities of the City of Rochester.

RECOMMENDATIONS

In undertaking to make recommendations based on a survey of this kind, these recommendations would be expected to follow certain conclusions drawn from the evidence presented.

The material which has been collected in this report is of such a character that in each department of inquiry it seems to lead so obviously to certain conclusions that the director of this survey believes these conclusions appear on the face of the evidence presented in the previous pages and that they are sufficiently plain to any intelligent reader. Consequently, no attempt will be made to draw up a complete list of conclusions.

The following recommendations are presented in the belief that the material of this report and the conclusions which are so obvious form a basis which must be recognized as justifying the recommendations herewith presented.

These recommendations are divided into four parts as they apply to four groups of persons, viz., to the city authorities, to milk producers, to milk dealers, and to milk consumers.

I

RECOMMENDATIONS TO CITY AUTHORITIES

1. It is recommended that immediate steps be taken to bring about the centralization of the business of milk distribution in the City of Rochester, on the ground that the present competitive system is a menace to public health because of insufficient sanitary care of the product, and because of unnecessary and excessive expenses.

2. That the City of Rochester join with the City of New York and other cities of the State of New York in asking for legislation at Albany for the purpose of securing for the City of Rochester and other cities such additional legal powers as will enable the city to control the distribution of milk, and that such legislation be asked for on the ground that such municipal control is necessary to properly safeguard public health.

3. That, in particular, the City of Rochester ask for amendments to the City Charter which will give to the city the following powers:

- (a) Power to establish and operate a municipal milk distributing business under municipal auspices, and to purchase the property of existing milk distributors if necessary.

- (b) Power to grant a franchise to a public service corporation for the distribution of milk and for municipal control of the same in respect to profits and prices and in all other respects necessary to protect the milk consumer against the abuse of power by such a corporation.

(c) Power to examine the books and accounts of all milk dealers distributing milk in the city, and to subpoena such books and such dealers for examination by designated city authorities when the interests of public health demand such examinations.

(d) That the legal status of the director of the Bureau of Health of the City of Rochester should be made identical with the legal status of the health officers of the City of New York, the City of Buffalo, and other first-class cities, so that this bureau, in its administration, will not be independent in any way of its responsibilities to the city government.

4. That, if the State Legislature will grant such powers for the control of the distribution of milk, any or all of these powers be made discretionary with the city and not mandatory.

5. That the city shall exercise such powers only in the event that the system of milk distribution provided by the milk industry proves itself to be inadequate for the proper safeguarding of public health through the practice of insanitary or imperfect methods or uneconomical service.

6. That the city authorities encourage the centralization of the business of milk distribution under the auspices of the present industry with the object of avoiding, if possible, the establishment of municipal ownership through the securing of efficient service under private ownership.

7. That the city immediately establish, as part of its sanitary code, milk ordinances and regulations suitable for a city of the first class, and in particular an ordinance requiring the pasteurization of all milk not produced from cows tuberculin tested and otherwise safeguarded against cattle diseases, human diseases and contamination, such requirements being equivalent to the requirements for certified milk.

8. That the city require the pasteurization of all milk used by public institutions and take steps to provide a milk supply adequate for the needs of all of the inmates of public institutions.

9. That the city arrange to dispense milk through the public schools at cost, so that at least one half-pint bottle (one glass) of milk can be placed within reach of every school child every day at the school lunch hour, in accordance with the system in successful operation at the present time in the City of Seattle.

10. That, under the auspices of the Board of Education, the weight and height of every school child be determined and recorded annually, preferably in one of the fall months, and that the relationship of the diet of the child, especially with respect to the drinking of milk, be also recorded with the purpose of determining the degree of undernourishment of school children and providing against such undernourishment.

(The data secured on this subject under this survey, although meagre and incomplete, emphatically demonstrates the vital importance

of milk to the growing child and suggests the great benefits which can be secured through systematic recording of the children's weight and height and steps to provide children with the milk required for their growing needs. In no other way can the city do so much for the welfare of its future citizens.)

11. That the city establish and maintain a sufficient number of infant milk depots, similar to those operated by the City of New York and elsewhere, for the dispensing of milk for infants and for children under school age to place within reach of the children of the poor, at a reasonable price, all milk required for such infants and children. These depots might be located in public schools or at other convenient points in the congested districts. The success of the New York infant milk depots justifies the City of Rochester in furnishing such a milk supply for infant feeding under such auspices.

II

RECOMMENDATIONS TO MILK PRODUCERS

1. It is recommended that the milk producers establish a milk factory for the handling of surplus milk, either in the City of Rochester or at some other convenient point. The milk producers' organization should assume entire responsibility for all surplus milk. Through the centralization of the manufacture of surplus milk into milk products, a great saving in loss from surplus would result.

The producers' organization would then be in a position to furnish to the milk distributing concerns of Rochester exactly the quantity of fluid milk which the market demands and losses on surplus, due to lack of facilities for handling the same on the part of small dealers, would be entirely eliminated. In such a surplus factory the producers can control to better advantage the milk furnished by the individual members of their organization, making butter fat tests, milk measurements, and carrying out cooling and refrigeration much more effectively than is done under the present competitive system.

2. That milk producers establish a centralized hauling system for hauling milk from dairy farms to the point of shipment, thus eliminating the numerous individual farmers' wagons now engaged in such hauling.

3. That milk producers eliminate as rapidly as possible dairy cows which are unprofitable, by establishing throughout the milk producing territory cow testing associations which will include every milk producer.

4. That milk producers increase the size of their herds as the quickest means of reducing the cost of milk production.

5. That the milk producers' organization agree upon a standard type and size of milk can, and that all producers use the same type and

size of milk can, for the purpose of reducing the cost of handling milk cans and increasing the efficiency of the washing and sterilizing of milk cans.

III

RECOMMENDATIONS TO MILK DEALERS

1. It is recommended that the milk dealers of the City of Rochester immediately take steps to centralize the business of milk distribution under their own auspices for the purpose of demonstrating to the City of Rochester that under such centralized system they can render to the city a service which will handle the product in such a sanitary and economical manner that their service will furnish satisfactory safeguards for the public health of the city. Only by rendering such efficient service as this can the milk distributors hope to retain the business of milk distribution in the hands of private capital, and avoid the establishment by the city of complete municipal control.

The advantages to be gained by the milk dealers under such centralization, including economies in freight, hauling, plant operations, delivery, office charges, purchase of supplies, all other expenses, and administration charges, have been pointed out in detail in the previous pages in this report.

IV

RECOMMENDATIONS TO MILK CONSUMERS

1. It is recommended that every parent or guardian of children secure not less than one quart of milk daily for the use of every growing child in the City of Rochester, and that those persons who are informed regarding the vital necessity of milk and other dairy products in the diet of the child make it their business to convey this information to those less well informed, and that, through women's clubs and other consumers' organizations, publicity be given to the food value of milk as compared with other food, even at present prices, and that all of the consumers of Rochester be made to realize that there is no substitute for milk in the diet of the growing child.

2. That milk consumers co-operate in reducing the loss on milk bottles by promptly returning to the milk dealer all milk bottles delivered to them, and that they also reduce the cost of bottle washing by returning the milk bottles in a cleanly condition.

3. That milk consumers co-operate in reducing the cost of collecting milk accounts by promptly paying the milk dealer for all milk received.

(In many cities of the United States and Canada a milk ticket system is used. The milk consumer pays cash for milk tickets in advance, thus

making the collection of milk accounts unnecessary. This system has many arguments in its favor in a city of the type of Rochester.)

RECOMMENDATIONS TO THE CITY AS A WHOLE

In considering the milk problem faced by the City of Rochester, there are certain aspects which affect the producer, distributor, consumer and city independently, and other aspects which affect these four groups of persons jointly.

The excessive costs of milk distribution shown in the material presented in this milk survey are costs which have grown up as a result of the competitive system. It must be recognized that the city itself is primarily responsible for the competitive system of milk distribution which now exists.

Rochester is not alone in this responsibility, but the same is shared by all other cities of America which, by their antagonism to centralization and monopoly in the milk industry, have fostered within their limits the growth and development of the competitive system of milk distribution.

Public attention which has now concerned itself in Rochester and other cities with the cost of milk and the relation of milk to public health has suddenly discovered this competitive system carries with it numerous unnecessary expenses. The remedy which is prescribed as a result of all milk surveys and all commissions and committees appointed to inquire into the cost of milk distribution is, in every instance, centralization and monopoly. In short, the competitive system which the people themselves have fostered and developed is now charged with the excessive cost of milk to the milk consumers, and held responsible for not providing milk at such prices as could be secured only under a monopoly.

The attitude of the public mind toward the milk industry is therefore inconsistent and unjust in that the remedy, viz., centralization and monopoly, which is universally prescribed, is a remedy which the industry itself has not been allowed to apply. Any efforts toward centralization and monopoly by the milk industry have been universally cried down by the public on the ground that the result would be a trust injurious to public welfare.

The advantages of centralization and monopoly have become so obvious that the public has been entirely converted to the value of this remedy, and, in fact, convinced that centralization and monopoly constitutes the only remedy for reducing the cost of milk distribution.

Before proceeding to apply such a remedy as this under municipal auspices, it would seem only fair and just to invite the milk industry itself to make a demonstration of the efficiency of its service to the public through the application of this remedy under its own auspices.

In three cities in America the milk industry has been tacitly permitted to adopt centralization to such an extent that monopolies are practically in existence. These cities are: Calgary, Canada; Ottawa, Canada, and Milwaukee, Wisconsin. An examination of the conditions in these cities shows clearly that these milk monopolies have not taken undue advantage of their power, but have, as a matter of fact, rendered to the cities named a service unequaled by the milk industries of any other cities on this continent. In these three cities the cost of milk has been kept at the lowest point, and the dealers' spread, or share of the milk price, has been lower than in any other cities.

Consequently, in the City of Rochester, before proceeding to establish a monopoly under municipal auspices, it would seem to be more consistent with purely American policies to permit the milk industry itself to apply the principle of centralization to the business of milk distribution, and to make a demonstration to the citizens of Rochester of the efficiency of the service which it can render under such centralization.

The business of milk distribution is highly specialized. Public ownership would furnish no guarantee of efficient service unless it could guarantee the same high degree of specialization which has already been developed in the present industry. Public ownership should be held in the background as a last resort. It should be applied only in the event that the industry itself proves incompetent to render efficient service.

The proposition recently made by the executive officer of the largest milk company in the City of New York to the city authorities is one which deserves serious consideration by that city and by all other cities. This proposition is that a milk monopoly be organized by the milk distributors, but that the board of directors of such monopoly should include representatives of milk consumers and milk producers, and that a limitation of profits should be established, and that the books of the monopoly should be open to the public. This proposition has many features which would contribute to a satisfactory solution of the problem of milk distribution, and is a remedy which, in the opinion of the director of this survey, should be tried in advance of the application of municipal ownership.

The milk monopoly, under private ownership, would be in the public interests only provided the public were properly safeguarded against the abuse of the additional power which the milk industry would thus secure. The only way in which such a power can be properly counterbalanced would be through the securing of such additional legal powers by the city itself that the city can at any time control such monopoly and take over the business of milk distribution under its own auspices.

Therefore, the director of this survey, recommends that these two movements be inaugurated hand in hand. On the one hand the estab-

lishment of centralization under the auspices of the industry, and on the other hand the securing by the city of such additional legal powers as will effectively curb and control the action of such monopoly, with the ultimate purpose in the background of taking over the entire industry of milk distribution by the city in the event that the service rendered by the monopoly proves inadequate for the safeguarding of public health.

The reorganization of the milk industry from the competitive system which now exists to a centralized system will necessarily require extensive readjustments and at least several months of time in order to prevent unnecessary losses and to do justice to all business concerns.

The city authorities should allow a reasonable length of time for such a reorganization to be accomplished. If, after the expiration of such time, the industry shows no inclination to bring about such a reorganization, it will be proper for the city authorities to consider the centralization of the industry under its own auspices.

The feeding of infants and children presents a special problem. In order to place sufficient milk within reach of every growing child, the municipality is justified in going into this branch of the milk business under municipal auspices. The best channels for milk distribution to children and infants are the public schools and infant milk depots.

It is, therefore, recommended that the City of Rochester take immediate steps for municipal milk distribution for children and infants through the public schools and other infant milk stations.

RECOMMENDATIONS OF THE PUBLIC SAFETY COMMITTEE OF THE COMMON COUNCIL

Rochester, N. Y., Dec. 23, 1919.

To the Honorable, the Common Council of the City of Rochester:

Gentlemen—Your Public Safety Committee whom you directed by ordinance duly passed on the 22d day of April, 1919, to inquire into the several matters pertaining to the production and distribution of milk as affecting the City of Rochester, as more specifically set forth in the resolution which is hereinafter contained, do respectfully report as follows:

Your committee, upon authority granted by the Board of Estimate and Apportionment, employed Dr. Charles E. North of New York City, as director of the investigation, and such other assistants as he recommended. Much valuable assistance was given by organizations and individuals particularly interested in the subject, to all of whom the committee feels deeply indebted.

Examination on the ground was made of about one hundred and fifty producers of milk shipped to the City of Rochester, in various localities, with a view to ascertaining what it actually costs to produce the milk. A careful survey was made of the plant and business of each dealer distributing milk within the City of Rochester, for the purpose of determining the actual cost of milk distribution within our city limits.

Laboratory tests were made by the Committee's experts, of many samples of milk sold in the city and a careful inquiry was conducted into the character, quality and amount of milk and its products used in various institutions in the city and in private homes as well.

The results of the investigation are submitted herewith in the form of tabulations and explanatory comment appropriately grouped in chapters.

Your committee sought to afford every party interested an opportunity to state and prove his case, and determined from the outset to learn and permanently record for the benefit of the people of Rochester the truth in respect to every phase of the milk question, and thus to arrive at and establish a basis for any action which it might hereafter be deemed advisable to take. Your committee feels that this has been fully accomplished.

Dr. North was asked to prepare and submit such recommendations as he wished to make after concluding the investigation. These recommendations appear at the foot of the report. As to the suggestion that the City seek legislative authority to grant a franchise to a public service corporation for the distribution of milk, your committee is advised that the distribution of milk is not and may not properly be considered a public utility to be the subject of a franchise, but your committee concurs in the recommendation to secure all possible proper legislative authority for the direction and control of the distribution of milk.

Your committee finds and respectfully reports that it is not expedient for the City to attempt the purchase and distribution by the City of Rochester of all milk used within its limits at this time.

It must be borne in mind that having once embarked upon such an enterprise which would involve the expenditure of upwards of a million dollars, the City could not abandon the project but would be obliged to continue whether it succeeded or not. In other words, it is not a matter in which experiment is possible. Our investigation has disclosed that centralization of milk distribution will result in important economies which would accrue to the financial benefit of the consumers of milk by lowering the price to them. There is, however, no reason why such centralization may not be carried out by private individual effort, and your committee is of the opinion that the City of Rochester should attempt to secure this before attempting municipal ownership.

To produce the milk now consumed in the City of Rochester on municipally owned farms would require the expenditure of about twenty million dollars for land alone. Your committee has been unable to find that the City of Rochester would be able to lower the cost of production by this method, and therefore reports that to enter upon such a course would not be expedient.

Your committee respectfully recommends the adoption and rigid enforcement of ordinances prohibiting the retail sale of milk or cream within the city limits otherwise than in carefully closed containers, filled before being loaded for delivery, and requiring that all milk and cream sold at wholesale be contained in sealed cans or other containers.

Your committee further respectfully recommends the adoption and rigid enforcement of an ordinance requiring the proper pasteurization under municipal inspection and control, of all milk and cream sold in the City of Rochester, except certified and grade A milk, and that such ordinance take effect at the end of such a period as will afford reasonable opportunity for dealers to arrange their equipment accordingly.

The weighing and measuring of children in the public schools is regularly carried out during the year under the direction of the Health Officer, and is now being done. Your committee procured other data in respect to race, sex, milk-diet, etc., through the Department of Education, but a complete tabulation cannot be had until the weighing and measuring has been completed, and we have been able to include in this report only one table.

We respectfully recommend that when the weighing and measuring for the present school year shall have been finished, the tabulation be completed and made available for reference.

Your committee further respectfully recommends that its report be printed and bound so as to be available to all properly interested persons and organizations, with such arrangements and restrictions in respect to distribution either gratis or by sale as your honorable body shall deem wise.

Respectfully submitted,

GEORGE B. HART,
B. B. RAPPLEYE,
JOHN A. RUSSELL,
LINDEN STEELSMITH,
MARTIN B. O'NEIL,

Public Safety Committee of the Common Council.

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